

COMPUTERWORLD

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NEWS IN BRIEF

Index Reconstruction Ruling Expected Soon

NEW YORK—Judge David Edelman is expected to rule soon on a government motion that would require IBM to help the government reconstruct the data base destroyed as part of the IBM-Control Data settlement.

In a hearing on the matter here last week, the Justice Department argued that the index should not have been destroyed without the consent of the court here since IBM and the government had been ordered to preserve all records relating to their case.

It appears now that Edelman will overrule the government's motion, but that he might hold more hearings on the motion first to make IBM prove that the only thing destroyed was the work product of the CDC lawyers and not any of the documents in the case.

Report Finds Most Dpers Employed in Manufacturing

WASHINGTON, D.C.—A Census Bureau report on the American job and skills market revealed that in 1970 the computer field had 161,337 computer programmers and 79,949 computer systems analysts.

According to the report based on 1970 decennial census data, the largest numbers of computer specialists were employed in computer manufacturing and computer programming services. The report showed other industries employing large numbers of computer specialists include federal public administration, banking and insurance, colleges and universities, and aircraft and parts manufacturing.

Mean annual earnings among men in the computer field in 1969 was \$11,004 and among women, \$7,811, according to the Census Bureau study.

Copies of the report "Occupation by Industry," PC12-7C are available for \$7.25 from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

On the Inside This Week

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3,000 Attend Caravan/73 Kickoff



ICW Photo by L. Flanagan

Computer Caravan/73 visitors have plenty to keep them busy at the Iomate product display (Story on Page 6). The show attendees had a full PD menu ranging from user-oriented panels and workshops to a product exposition.

Communications Feast

Terminal Systems Abound

By Ronald A. Frank

Or the CW Staff

BOSTON—Terminal-oriented systems for both on-line and remote communications applications led the list of user products displayed at the Computer Caravan/73 exposition last week.

FCC Told AT&T's CRT May Violate Antitrust Laws

By Ronald A. Frank

Or the CW Staff

WASHINGTON, D.C.—AT&T may be planning to sell its new CRT terminal outside the Bell System in violation of existing Federal Communications Commission and antitrust agreements, according to a letter sent to the FCC by Inco-term Corp.

If the Model 40 display terminal, built by Teletype Corp., a Bell subsidiary, is sold to non-Bell suppliers and then attached to AT&T lines, it would "constitute the furnishing of a [DP] service," Inco-term told the FCC.

"Because of the sophisticated nature and usage of the [Model 40] terminal, the [AT&T] service would be a remote access data processing service or hybrid data processing service," Inco-term said. Under existing regulations, AT&T is prohibited from entering non-communications markets.

Apparently concerned about the Inco-term charges, the FCC sent a letter to AT&T on Jan. 22 requesting that Bell "advise us fully with respect to the plans . . . of Teletype Corp. to enter the market of computer terminals. . . . The

(Continued on Page 2)

van/73 exposition last week. Many of the terminal products are compatible with the IBM 2780 and 3780 terminals or were described as replacements for teletypewriters.

Inco-term Corp. introduced its SPD 900 remote batch terminal series which can also operate in interactive applications. The system is available in three models, all push-button compatible with IBM 2780 and 3780, Univac 1004, CDC User 200, 360/20 Hesp and ICL 7020-based operations.

400 Line/Min Printer

Model 901 has a 150 card/min reader and a 200 line/min printer; Model 902 has a 300 card/min reader and a 200 line/min printer; and the Model 903 has a 300 card/min reader and a 400 line/min printer.

All models come with a programmable display terminal which provides for synchronous communications rates of 200- to 9,600 bit/sec in half-duplex mode.

Purchase prices are \$17,900 for the SPD 901, \$20,500 for the 902 and \$22,400 for the 903. Various leasing plans are available from 6 Sirthmore Road, Natick, Mass. 01760.

For the Man With Everything

For the executive who has everything except a miniature CRT on his desk, Delta Data Systems Corp., Cornwall Heights, Pa., showed its 5900 terminal which is "packaged" in a walnut grain cabinet.

The device contains a standard RS-232C interface and can operate at prespecified speeds from 110 to 9,600 bit/sec. Data characters can be displayed in two intensities in 16 lines of 32 characters. The full-duplex terminal costs \$2,000 and is available in 90 days.

(Continued on Page 6)

18 Workshops, 300 Products Drawing Cards

By E. Drake Lundell Jr.

BOSTON—It's off and running again. More than 300 products valued at over \$10 million provided the sparkle on the exposition floor while 18 workshops or panels gave users new insights in managing data processing installations as the Computer Caravan/73, sponsored by Computerworld, was launched here last week.

Approximately 3,000 users and industry figures attended the three-day show which began its 10-city nationwide tour with 52 companies displaying their wares in 68 booths.

The number of exhibits for the second running of the Caravan was up 50% over last year, and the workshops and panels

Other Caravan coverage on Pages 2-7.

provided for computer users were twice as long as last year's, according to Caravan officials.

The exhibit floor was highlighted by the almost 25 new product announcements made on the first day of the show, with Iomate getting the honors for most new products on display with 13.

Many of the other introductions did not involve completely new systems, but featured enhancements to existing products that are available and in use in the field.

Almost every segment of the industry was represented on the exhibit floor with communications-oriented or terminal firms leading the way but with a strong second place showing by data entry and particularly key-to-disk firms.

The major sector of the industry not represented on the floor was the large mainframe makers, but in their place users could see the offerings of every other area ranging from minicomputer makers through tape, disk and memory suppliers to software houses.

The watchword on the Forum side of

(Continued on Page 2)



New Sister

Hidesuna Sasaki, editor of Shukan Computer, Computerworld's new sister weekly in Japan, looks over an initial copy of the newspaper. Story on Page 25.

Full Range of Exhibits, Panels Launch Caravan/73

(Continued from Page 1)
the Caravan was efficiency and overcoming day-to-day problems through user interaction.

Users Warning Users

The panels and workshops consisted entirely of users experienced in a particular area discussing their experiences and warning other users of potential problem areas.

In all, more than 300 users attended the sessions on data entry, data communications and installation management, each given on a separate day.



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Even more attended the open afternoon sessions which featured a tutorial on data communications, and panel discussions on software evaluation and small systems usage.

"It's refreshing," one user said, "to attend sessions like this where another user can fill you in on the problems with particular systems - problems that are never mentioned by the manufacturers or the technical experts who speak at some other shows."

The mood of the entire show was definitely upbeat: exhibitors were happy about the prospect of sales, while attending users said the exhibition and forums provided new information and choices in equipment selection.

"We're looking at a key-to-disk system," one user noted, "and the forum on these systems plus the three displays on the floor opened our eyes to what's available - and what the problems might be. In fact, we had never heard of one of the exhibitors before it was mentioned in the panel discussion."

Several sales were reported directly off the floor of the show, with the first coming only one hour after the exhibit hall opened the first day.

"We're seeing so many prospects that I'm completely set up for the next two weeks," one New England sales representative said on the second day of the show. Several users commented on the bus-like atmosphere in the exhibit hall, where most exhibitors stressed the technical aspects of their systems as opposed to flashy or sensational displays.

Next week the Computer Caravan/73 travels to Washington, D.C., to be followed after a one-week break by New York City, Atlanta, Houston, Anaheim, San Francisco, Kansas City, Chicago and Cleveland.



Partial View of the 68 Booths at Computer Caravan/73 in Boston.

Bell CRT Terminal Under Attack

(Continued from Page 1)
FCC letter requested an AT&T reply within 30 days.

"It is our feeling that this unit is nothing more than a Teletype terminal which will be 'subject to the same usage' as other Teletype equipment already in the field," an AT&T spokesman said.

The Model 40 display will cost about \$3,000, which is well below the cost of comparable non-Bell terminals, Incoterm said. It would be impossible for Teletype Corp. to supply the Model 40 at this price without "some direct or indirect" revenue subsidies from "regulated common carrier services," Incoterm told the commission. While users would probably welcome

the introduction of a low-cost display by the Bell System, Incoterm believes the long-term effects would lead to an unfair competitive environment. Incoterm CRT terminals now cost from \$7,500 to \$9,700 and "comparable IBM equipment ranges from \$11,500 to \$15,870" for the 3270, Incoterm said.

The Teletype Corp. CRT reportedly will utilize MOS technology which is being developed in-house to allow the low price. The Model 40 is expected to include a CRT, keyboard printer and an optional half-inch mag tape cartridge capable of storing 150K bytes of data. The CRT is said to have a 96-character alphanumeric set that can be displayed on a screen of 20 lines by 80 characters. In the terminal buffer is said to be included in the 72-line buffer will be TTY-compatible and will handle Ascii, Baudot and typesetting (6-bit) code.

The unit will transmit with synchronous modems in a start/stop format but the modems are not expected to be part of the terminal and will be priced separately.

The printer is expected to handle 40-, 80- or 132-character lines with 64- and 96-character sets and will operate at 240 line/min.

If AT&T introduces the system, IBM will have to decide whether its teleprocessing systems will support the Model 40. The teletypes supplied by Teletype are among the few non-IBM devices supported by IBM with the 2701 and 2703 line controllers, according to one industry source.

The Teletype CRT is reportedly scheduled for introduction during the International Communications Association (ICA) conference to be held this May in Boston, industry observers noted.

Bell 'Conditioning' Found Deficient

By Don Leavitt

BOSTON - "Conditioning" - to assure effective data transmission - is often one reason cited for a user's move to private lines, but nowhere in the Bell System does the carrier automatically provide preventive maintenance to assure the conditioning. Kerry Overlan, assistant telecommunications manager for First National Bank of Boston, told a Caravan/73 workshop on leased-line usage.

That lack of follow-through by the major communications carrier, combined with the "bewildering array" of service offerings expected "sometime" from the specialized carriers, and the vast number of equipment vendors, make today an exciting but "dangerous" time to be planning or installing

any data transmission operation, he said.

Many "war stories" can be told about user attempts to explain a specific data problem to a Bell repair service operator, the workshop attendees agreed. The best way around that problem, Overlan suggested, is to get friendly with one specific, knowledgeable repairman.

"Get him a jug, or buy him dinner. Then when you need help, call him directly, and don't bother with repair service," he said, only slightly tongue-in-cheek.

More seriously, he noted, there are objective third-party testing services to check conditioning at "very slight" cost. Several users in the workshop agreed, saying they had used these services and felt they were good.

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Slow to Change Logic

'Packaged' Users Run Blind

By Don Levitt
Of the CW Staff

BOSTON—Sometimes all the in-house staff knows—even after a packaged system has been considered operational a few months—is that "it seems to work," according to Paul Ladd, programming manager for Worcester (Mass.) County National Bank (WCNB). It may be as much as a year after the initial use of a system before the user knows enough to get where and how he might like to modify the program logic.

With much the same thought in mind, Star Market DC director Donald MacKinnon told the Computer Caravan/73 software evaluation panel he would never contract for custom programming of an application that he knew was going to entail heavy maintenance. Systems such as payroll, with its required updating of tax routines, are much better coded in-house, he said, so that the maintenance programmers know the program logic.

Any user's primary line of business is a

key factor in how well he can utilize packaged application systems. Work done in all commercial banks is similar, Ladd stressed, and there are many packages available and useful to them.

Retaining, on the other hand, isn't like that, MacKinnon said. As a result, Star hasn't bought any application packages even though MacKinnon wants to avoid reinventing the wheel if at all possible. Both users reported they used or were evaluating DP-related packages such as spoolers, automatic job schedulers, machine utilization report systems and a package that loads DOS programs in relocatable form. Ladd noted that 30% of his in-house programming is coded in Adpac, a packaged, proprietary language.

When Star does go to custom programming, MacKinnon said, it does the design work and it provides the DP standards the result must meet. The company insists on contracts with a "not to exceed" fixed

price clause. That way it doesn't have to worry about the productivity of the programmer; the custom house proprietor will see to that.

Documentation Hit

Documentation that accompanies most packages was roundly criticized by both Ladd and MacKinnon. Ladd said that most buyers are getting the proverbial "pig-in-a-poke," but that checking the

Dial-Up Moving Up

BOSTON—Dial-up communications are continuing to improve while the quality of private lines has remained relatively static.

This was one of the opinions presented to users at the Computer Caravan/73 workshop on dial-up facilities. Dial-up is a user has at least 60 hours of transmission time per month and can tolerate longer response times than private lines, the switched network offers important efficiencies, according to Ralph DeMent of United Brands.

Interconnection standards for voice units will probably be an outgrowth of similar advances in the voice area, DeMent predicted, citing the voice-oriented Carterfone decision as an obvious example.

The dial-up user who installs independent data equipment should understand the functional signals of the RS-232 interface, DeMent said. And Bell will provide users with specifications of the interface on request, he added.

If Datran can provide its promised three-second connect time compared with the 18-second connect time of Bell, "we would use it," DeMent said.

track record of a system—through on-site visits to current users—is one way in which WCNB evaluates a package before buying.

Call for a 30-day trial if the package looks promising, he added. If it is finally acquired, "pay for it in stages, as the vendor satisfies your doubts. And don't be in a hurry to make the final payment until you're really satisfied with the whole thing," he advised.

Communications User Is Still Reluctant To Mix His Systems

By Ronald A. Frank
Of the CW Staff

BOSTON—Despite the proliferation of non-Bell data equipment many users are still reluctant to configure mixed data communications systems.

But careful selection of independent equipment can often lead to important cost and performance advantages, users agreed at a Computer Caravan/73 panel session on data communications.

Equipment vendors and carriers have not yet come to a basic understanding of how they will work together, according to Ralph DeMent, systems engineer at United Brands. And because of this lack of a common approach the user often is caught in a fingerprinting session, as communications problems occur, he said. What is needed is an attitude of mutual trust between vendors and carriers, DeMent stressed.

Take a Consultant to Lunch

One way to insure enough attention from the local common carrier is to develop a friendship with the local data representative, suggested Stan Dunten of the technical staff at the Dartmouth College Keweenaw Computation Center. By taking a data consultant to lunch, the user may be cutting possible red tape that might later be encountered when line problems occur.

For users planning to integrate independent equipment into their networks, Kerry Overlan of Boston's First National Bank offered a novel approach. Those users should first configure their systems with all Bell equipment, and then when the network is fully operational switch to independent hardware. If independent equipment is truly compatible with Bell, then there should be no problem in substituting the non-Bell units, Overlan suggested.

On Building a System

BOSTON—Management factors involved in the implementation of a computer/communications network can often overshadow the technical considerations. The communications manager, therefore, must have an appreciation for corporate goals, according to Gilbert H. Hoxie, manager of the Information Systems Division at Booz Allen & Hamilton Inc.

Speaking at a Computer Caravan/73 session on data communications planning, Hoxie urged users to carefully analyze proposed communications systems using management techniques. The analyst should assume the role of those who have to use the projected system, he said.

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One Application May Justify Keypunch Replacement

By Don Levitt
of the CW staff

BOSTON — With planning and patience, even a single application may cost-justify the installation of a data entry system more modern than keypunching. And once installed, it can be used for other applications with even further dollar savings or operational improvement.

That was the message of the data entry panel at the Computer Caravan Users' Forum and it applied as much when Martin McDonough described an intelligent terminal installation at Fanny Farmer, as when Everett Lawton outlined a shared processor key-disk operation at New England Electric.

Zayre Corp. has used optical character recognition (OCR) scanners very effectively for some of its large volume applications. Noel Goulston, Zayre's corporate methods manager, told the panel. And Herb Cronin added to the discussion with details of a direct entry system at First National Bank of Boston.

At Fanny Farmer, a network of Sycor terminals handles order entry, interconnecting the candy maker's plant, distribution centers and corporate headquarters, and the new operation costs less than the keypunch-printing-mail out operation it replaced.

New England Electric has been able to save about \$1,500/mo in machine rentals alone, since shifting from keypunch to key-disk processing for much of its

customer accounting, Lawton said.

Accounts payable was the benchmark application used by Zayre to cost-justify its installation of IBM 1287 OCR units. Despite the company's original hesitancy, the devices have effectively broken the logjam which had built up in the data entry area because of both physical and personnel constraints, Goulston told the 300 or more users in the audience.

First National Bank went to direct entry to cope with a large volume of input records, each of which had a high value and therefore had to be handled very

carefully even though the bank received a very slight service charge per record processed, Cronin explained. The new approach enabled the bank to realize a staff reduction of 25%, he noted.

Even as they had their triumphs, each of the installations had at least some problems. Zayre, for example, found the 1287s somewhat sensitive to the quality of the handprinting or turnaround printed documents, Goulston said, and an operator has been assigned to check printer output for voids or fills that would be unreadable.

Fanny Farmer's operation suf-



City Photo by M. Lipson

Martin McDonough describes Fanny Farmer's intelligent terminal network.

fers if a janitor or anyone else in a remote site turns off the Sycor unit, since the system is designed to operate in unattended mode

overnight. If the unit is off, the operator or at that location has to wait until the next morning for her reports, McDonough noted.

OCR Devices Mean 'Gravy'

BOSTON — Viewing optical character recognition equipment as a keypunch replacement, not as an omnipotent input device, Zayre Corp. has found the installation of an IBM 1287 more than justified on one application alone.

Any other applications later put on the scanner "are pure gravy," according to Zayre's Noel Goulston at the OCR workshop.

There are, however, several keys to the successful implementation of the scanner system, most of which originate from "good horse sense" of fully utilizing the capabilities of the

(Continued on Page 5)



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Intelligent Terminals 'Tutorial'

Users Told to Evaluate Cassette, Language Features

By Don Leavitt

Of the CW Staff

BOSTON—Only one or two users who attended the Cera-van/73 workshop on intelligent terminals had practical experience with the programmable devices and so discussion leader Martin McDonough ran what amounted to a tutorial session based on his experience at Fanny Farmer Candy.

McDonough said any user considering intelligent terminals should evaluate the units' capability to have cassettes and the

available capacities; the programming language provided; and the kind of usage he expects to get from the units.

Other factors to consider, he said, are the type of printer, and the type and size of the CRT screen, as well as buffer sizes, and the availability (and desirability) of features such as automatic tabbing from one field to the next.

McDonough had been responsible for the installation of the Sycor terminals that provide Fanny Farmer with a 1,200

char./sec communications system independent of its Honeywell 115 mainframe, but linking the candy maker's distribution centers, its factory and its corporate headquarters.

Largely because orders are received by mail, the communications flow is predominantly outgoing from the DP center, occurring after nightly batch processing on the H115. When the center's Sycor is off-line, it is used as an additional key-entry device, along with a mix of Mohawk Data recorders and Univac

buffered keypunches, he said.

The on-line, off-line flexibility is one feature McDonough said he liked best about intelligent terminals. Another is the "tremendous" editing and formatting capability that is possible through programming and the use of cassettes.

Complete conventional editing—zero filling, justification of fields, data type checking—and very rapid check digit calculations, which Fanny Farmer uses on account number, stock number and order number, are all

handled in less than 4K bytes of core on the terminals. Comparable routines on the mainframe take about 40K characters, he added.

OCR Devices Mean 'Gravy'

(Continued from Page 4)

scanner and the inclinations of personnel, he said.

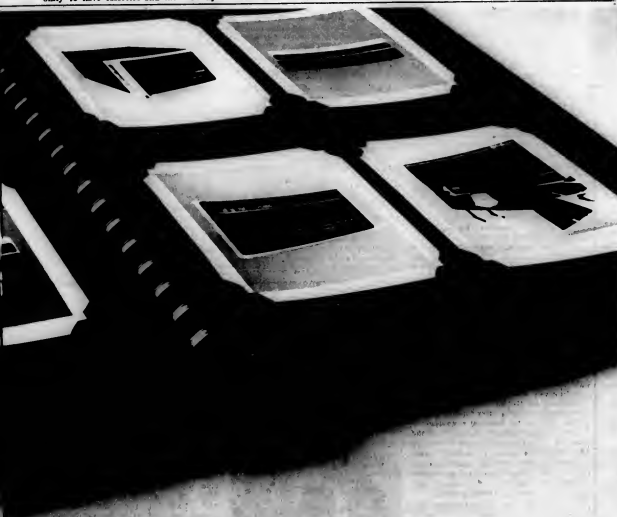
Goulston offered some pointers: design the form so the reference mark is out of the way of a person's hand when writing, to avoid smudging; have the check digit preprinted in gothic font, which is misread very rarely; and make full use of "editing for protection."

Zayre's 1287 requires 18K on its 370/155, which has 1.5M bytes of core. Such checks as check digits, hash totals, field verification, edit fields for minimum, maximum values, and editing for customer number, all serve to cut down the number of substitutions.

Zayre has implemented steps to aid the operator in assuring correct printer alignment, and found that Mylar ribbons, although more expensive, are preferable to 3 mil nylon. "We plan on 100% reading of machine-printed material."

Illegible characters are corrected by the DP department rather than sending them back to the user for clarification, as "we're the department saving the money using the scanning, not the user. We want the user to be happy with OCR," he said.

The savings are impressive at Zayre, which had 14 keypunch workers before the scanner, and now has two. The speed of the unit is between 80 to 120 times as fast as a keypunch/verifier. Goulston estimated this is a savings of about \$8,400/mo. less scanner rental which is about \$3,800/mo.



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Delta Data Systems mini CRT is for executive use.



Anderson Jacobson's Acoustic Coupler and Cassette Unit



Roger Paquin from Inter Continental Airfreight tries out Inco-term terminal while John Keyes helps.

Users get the fine points of the Sycor terminal.

OW Photos by Louise Pappas

Terminal Systems Abound at Caravan

(Continued from Page 1)

General Computer Systems Inc., Dallas, Texas, added two features—Datatel and Datatext—to its GCS 2100 key-to-disk data entry system.

Datatel allows 2100 users to communicate with other 2100 or 360/370 systems with a line protocol said to be compatible with IBM 2780 and 3780 terminals.

The Datatel capability will support both remote job and remote batch entry applications at speeds up to 50 kbit/sec in full- or half-duplex mode.

For Hsp users, the Datatel feature provides automatic sign-on and sign-off records and allows JCL to be inserted, the company said. Ebclic, Ascll and IBM transcode are standard as well as Touch-Tone phone and remote CRT input.

Datatext costs \$100/mo with first installations scheduled for June.

Datatext is a hardware/software automatic letter writing package that includes variable statement generation, paragraph

linking, variable text insertion and related features. It is available in 90 days for \$100/mo.

Interface With Memory

I/O Devices showed its 210, 30 char./sec KSR printing terminal. The 2741-compatible system has 132 print positions and costs \$4,995 or \$115/mo. The terminal includes a "memory" in the communications interface which eliminates the addition of delay and fill codes during long functions such as carriage return and tabbing. I/O Devices Inc. is at 100 Route 46, Mountain Lakes, N.J. 07046.

Anderson Jacobson displayed its 4100 and 4120 cassette recorders designed to operate with the AJ630 Teletypewriter and the AJ841 Selectronic. The tape units store up to 70K characters on a Phillips-type cassette and can perform automatic searches of up to 99 files of data, according to the company.

The cassette units cost from \$2,200 to \$2,500 depending on the model or about \$110/mo. The company is at 1065 Morse Ave., Sunnyvale, Calif. 94086.

In the add-on core area, Electronic Memories & Magnetics Corp. showed its Micromemory storage system which can operate with the 360 models 30, 40 and 50 depending on which circuit cards are installed in the system. The memory system costs about "40% to 50% of IBM prices," according to a spokesman. EMM is at 12621 Chadron Ave., Hawthorne, Calif. 90250.

Sycor added a high-speed line printer to its 340 intelligent terminal. The 3486 printer operates at 300 line/min with 132-column forms and at 600 line/min with 72-column forms.

The unit, which has a 19.5-in. platen and rents for \$470/mo, is designed primarily for remote job entry applications. Sycor is at 1100 Phoenix Drive, Ann Arbor, Mich. 48104.

Peripherals, Data Entry Terminals

Iomec Welcomes 13 Additions to Line

By Michael Weinstein
Of the CW Staff

BOSTON—Iomec led the new products portion of the Computer Caravan/73 Exposition with the announcement of 13 additions to its line of minicomputer peripherals and data entry terminals.

The Porta-verter terminal is an upgrade of the earlier Dataverter and is about the size of a portable typewriter. It utilizes micrologic circuitry to provide capabilities including cartridge magnetic tape, hard copy, status indicators, an electric keyboard, untended transmission and acoustic or hardwired DAA coupling. An integrated line printer provides journal hard copy for an audit trail and assists in operator correction procedures, the firm's spokesman said.

Arithmetic features include two registers for control total accumulation, credit balance printout and optional check-digit verification.

Communications transmissions are in Ascll at 1,200 bit/sec. The Porta-verter comes in several models; the Model 40, which incorporates a full range of features, costs \$2,350. Lease plans are also available at a monthly charge of \$55 to \$85.

The OEM Line

New products aimed primarily at the OEM producer include disk drives; paper tape punches, readers, handlers and punch/reader combinations; magnetic tape drive units including dual and triple packages; microcircuit decks; and additions to the Iomec line printer.

The 2560 paper tape reader operates asynchronously from 500 to 1,000 char./sec. At 500 and 600 char./sec, it is designed to stop on the sprocket of the stop character and at 1,000 char./sec, it stops before the next character, a spokesman said.

Priced at under \$1,000, the unit incorporates a lensless optical system that Iomec states eliminates light source adjustment.

The Series 400 Punch/Handler operates on mylar or paper tape at 70 char./sec.

The Model 170 is a 70 char./sec punch made by GNT Automatic of Copenhagen,

char./sec asynchronously.

The 4040 is an integrated tape handler which includes the Model 2540 reader. The unit operates synchronously at up to 300 char./sec right-to-left, with 1,300 char./sec rewind.

The 4040 can handle up to 580 feet of tape on five-inch reels, the spokesman added. Quantity price, complete with electronics and power supply is \$1,170.

Disks on Display

The Iodisk 3000 Series utilizes removable top loading disk cartridges—IBM 5440 or equivalent—in combination with a fixed disk. The Model 3042 has a capacity of 48M bits using 100 track/in. The Model 3404 has a 96M bit capacity with 200 track/in.

Average access time is 55 μ sec with an option of 35 μ sec available. The 3402 costs \$4,205 and the 3404 sells for \$4,960.

The Model 31 is the newest addition to Iomec's line of flying head floppy-disk system. It contains one disk drive with a moving arm access mechanism and two magnetic heads providing add-on mass storage of 3.5M to 10.5M bytes, a spokesman said.

Several new additions to the Series 3 magnetic cartridge line were also announced. The triple, dual and single rack-mounted models store up to 300K bytes. The triple unit version Model 313 with controller costs \$1,750.

The Series 3 Transport, Model 101, is designed for mounting inside a mini-computer to provide an ROM-type capability. It can also be used as a portable diagnostic program entry device.

The Model 9150 Controller connects the computer to both 800 KHz. IN NR21 and 1,600 char./line formatters at the

(Continued on Page 7)

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Advantage of Real-Time Systems: Clean Up Errors as They Occur

By Ronald A. Frank
Of the CVC Staff

BOSTON—A major advantage of on-line data entry is that the process "cleans out errors as they occur rather than save them for a later edit cycle, according to Herb Cronin, assistant vice-president of Boston's First National Bank.

The real-time system at the bank handles accounts receivables, stock transfers, freight payments and mutual funds. The system includes 130 Sanders 720 CRTs which access a DP center with dual 370/155s, Cronin told a Caravan workshop on real-time systems.

The real-time transactions have a 1.5 to 3.5-second response time, which is significant because all terminals are in contention for CPU and disk (3330) time, the user said. Although the on-line transaction processing has helped to reduce operating costs, Cronin said he favors saving large file updating jobs until the nighttime hours.

The real-time system operates eight hours a day and handles about 25,000 transactions a day. This volume may include 40,000 individual messages originated at CRTs, Cronin said.

No Noise

Among the benefits derived from eliminating his keypunch operation and switching to the on-line system are the elimination of keypunch operating noise and a slow 20% to 35% savings in personnel achieved through natural attrition, he said.

The bank wrote its own teleprocessing

monitor to handle the on-line system which was begun in 1968. The in-house software development would not be required today with the more advanced software commercially available, he said.

Remote Operation

While most of the CRTs operate in local mode hardwired to the dual 155s, some operate remote. Dial-up lines of 1,200 bit/sec are used by CRTs in Los Angeles and conditioned private lines operating at 2,400 bit/sec are used to transmit data several miles from a site outside Boston, he said.

The Sanders CRTs were chosen because they offered features "in advance of the industry," Cronin said. He emphasized that once equipment is selected for a real-time system, "the die is cast." Despite initial problems with system design the system now operates at about 99% efficiency, he said.



General Computer Systems Shared Processor System.

Visitor samples I/O Devices teleprinter.



EMAM shows add-on 360 memories.

Iomec offers 13 new products at its booth.

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Iomec Adds to Line

(Continued from Page 6)

same time with up to four feeds on each formatter, a spokesman said. It is priced at \$2,100.

The Model 202 medium-speed printer incorporates a multifeed buffer which automatically adjusts speed to the type-writer set, permitting the unit to operate at speeds up to 526 line/min.

Iomec, Digitronics Division, is at Rt. 9, Southboro, Mass. 01772.

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10 a.m. to 6 p.m. daily. Tickets are \$5 per person and should be purchased at the door.

Editorial

Leasing: the Piffalls

As equipment lease plans become more sophisticated, the user appears to benefit from lower prices and better package deals.

But there are also some unusual constraints a lessee must live with. The lease plan often becomes a corporate financial situation with DP trade-offs becoming secondary.

The DP manager can certainly bring some important cost considerations to the attention of his management, but the equipment operating characteristics and corporate DP goals must not be incidental.

The controller who signs on the dotted line for a lease offer he couldn't refuse, without accepting the technical counsel of his DP manager, can easily bring grief on his company.

Letters to the Editor

After the Seven Dwarfs— Make Way for Pied Piper

In the past, the data processing industry was described as Snow White and the Seven Dwarfs, with IBM being "Snow White." Since Dopey and Sneezy have subsequently died, this particular analogy is no longer apt.

Now, IBM could best be considered the "Pied Piper of Hamelin." If one recalls, the Pied Piper disposed of the rats (the competitors). Subsequently, after not being properly paid for his work, not meeting 200% profit growth per year, the Pied Piper then took the children (the customer) and disposed of them.

It must be recalled that there was much consternation in the town of Hamelin after this particular act occurred. Finally, the Piper obtained his price and all was settled with peace (the consent decree of 1974).

It appears that the rats were paid off by IBM's legal staff and were allowed to live happily ever after, never to be heard from again.

I am not too sure whether the children of Hamelin, who should be the recipients of the computer industry, ever did or will benefit from the conclusion of this fairy tale. Most fairy tales end with "and they lived happily ever after."

Timothy Allen

RPG II Users Arise!

The Wave Is Rolling In

At last! Someone has spoken up for RPG II [Viewpoint, CW, Feb. 7]. RPG II has been overlooked, misunderstood and maligned for too long.

I wonder how many IBM DOS users (or IBM reps, for that matter) are aware of the power and flexibility of IBM's RPG II package? The compiler produces code that is very efficient from a core

utilization and throughput standpoint, and is a far cry from the standard "free" DOS RPG compiler. There is even an optional feature that implements a "SORT" verb and a "COPY" verb, and further simplifies coding.

RPG II is not just for the System/3 or 360/20 user, nor is it just a "quick and dirty" report generator. It can easily (and very effectively) be the only language in a commercial DOS shop, and will beat Cobol hands down any day.

Enhancements are indeed desirable, especially the "CLOSE" verb mentioned, along with an "OPEN" verb, particularly for heavy tape users. Also badly needed is an improved table/array search routine, similar to the binary search implemented in 360/20 DPS RPG.

RPG II users arise! A vocal group of users is needed to support RPG II, spread its use and encourage its further development. I would be happy to hear from anyone with similar thoughts. Maybe N.M. Demos has started something; RPG II may indeed become the "wave of the future."

T. W. Dowling, CDP
Manager, Data Processing
States Steamship Co.,
San Francisco, Calif.

Welcome to Postal Chess

As readers of *Computerworld* and former members of the EDP community, we at the U.S. Chess Institute invite all CW readers to compete in our industry-wide postal chess tournament. Let's find out where the EDP grandmasters really are.

More information is available from the U.S. Chess Institute, 6 E. 43rd St., New York, N.Y. 10017.

Dyan Parker
Secretary

U.S. Chess Institute
New York, N.Y.

Story Lines Reader

After reading the article entitled "Societies Rally to Support Computer Foundation Plan," I am interested in applying for both a Certificate in Data Processing and Registered Business Programmer. How can I apply for these exams?

Albert A. Peterson

Centersch, N.Y.
The Data Processing Management Association, which administers both exams, is at 505 Buss Hwy., Park Ridge, Ill. 60068. Ed.

Computerworld welcomes comments from its readers. Letters should be addressed to: Editor, *Computerworld*, 797 Washington St., Newton, Mass. 02160.

The User's Burden



In-House Translator Was Fine But It Solved the Wrong Problem

By Miles Benson

Special to *Computerworld*

Over 1,000 programs from an aging old computer to its spanking new one.

The vendor for the new computer didn't offer any conversion aids that Company Q could use. It was pioneering, for one thing... no one had ever made this particular conversion before.

And the new vendor marketed hardware at an unbeatable price; software, that which came along in the deal, was minimal.

But Company Q wasn't worried. It had put together its own software team to compensate for that particular problem.

One of the pieces of software to be built

level source to object code were worked out in detail. No hitches to the original design, turned up as implementation worked down to the nitty-gritty. Oh, there were around 100 macro statements in high-level Autocoder, but that only impacted the bulk, not the feasibility, of the task.

Several satisfying months went by. The QTRAN team built its compiler, built its object library and began checking it out using little test problems of its own design.

As the obvious bugs were found, the team's confidence grew. As the subtler bugs were found, things looked even better. QTRAN was able to take anything thrown at it.

It was ready to be tested in the real world.

The team checked in again with the Autocoder users, and asked for a few production programs to run as guinea pigs to help wing out the system.

The compiler, scanning the Autocoder source programs for syntax errors, churned out an inordinate number of diagnostics. On closer inspection, most of the errors turned out to be unidentifiable statements. The borrowed programs simply weren't coded in the language QTRAN was prepared to process!

"Oh," said an Autocoder user when they returned to him for an explanation, "those unidentifiable statements are one-for-oners."

"One-for-oners," the QTRAN staff said. "What are those?"

"Non-macro statements," the Autocoder user said.

"But we were told you didn't use that kind of statement," the QTRAN team said.

"Management told us not to," the Autocoder user said. "But most of us found that wasn't practical, so we went ahead and used what we had to get the job done."

The truth was beginning to get through to the QTRAN team. The processor it had built simply didn't match the programming practices of the public it was designed to serve.

And there was no way to salvage the situation. Translating one-for-oners called for an entirely different design approach. QTRAN was, quite simply, worthless.

No one threw the QTRAN listings away. It had been a good implementation job, something to be proud of. And the QTRAN team was proud.

It was a peculiar pride, though, tainted with the knowledge that the problem it had solved so well was the wrong problem.

Viewpoint

by the in-house team was a translator to convert Autocoder jobs to something which would run on the new computer. The translator task was assigned to a carefully chosen group of compiler specialists. The project was named QTRAN.

The QTRAN group took a cautious and conservative approach to the project. It became as familiar as it could with Autocoder, studying the documents and consulting with users. It surveyed the software available on the new computer, and picked a feasible implementation approach.

Everything seemed workable. With its direction set, the team reviewed and revamped earlier rough cost and schedule estimates, had them bought off by management and set to work.

Company Q, the QTRAN team learned, had been using a unique portion of Autocoder. Management had directed that Autocoder programmers use a high-level version of Autocoder using general-purpose macros. A few exceptions had been made, but for the most part all 1000-plus programs had been coded in this high-level, macro Autocoder.

QTRAN, then, could simply be a compiler, taking Autocoder macro source statements in and spitting out new computer object code ready to be loaded.

The new computer had a cracklejack loader, the QTRAN team had learned, with some special modules for interfacing user-built processors so that object code generation and loading were a breeze.

And the translation task itself wasn't too bad.

The algorithms for conversion of high-



Could Be Declared 'Non-Standard'

New Cobol Verbs Handle Videos, Keyboards on Mini

Cupertino, Calif., was recently the site of some very exciting Cobol developments. A mini-computer firm, Four Phase Systems, introduced an Ansi Standard compiler. That is news in itself—but in addition the compiler provides extensions of Cobol which allow keyboard data and video terminals to be used easily and effectively.

The Taylor Report
By
Alan Taylor, CDP



Now, under the current proposal before the American National Standards Institute, Four Phase is threatened with having its compiler declared "non-standard" by a committee composed of representatives of competitive implementers who have not developed the language to the same extent, or onto the same level of equipment.

The Four Phase developments in the language include a section in the Environment Division where a user can specify the video screen size for his program. This allows him to define the screen size, giving the number of lines per screen, and the

number of characters per line. Under the current Four Phase system a maximum of 24 screens, or terminals, can be supported while the line lengths are either 48 or 81 characters. However, nothing in Cobol requires this restriction.

All the video screens can be programmed independently from the other through the standard use of subscripted or indexed variables in the Procedure Division. These variables control the input and the display of data on the particular terminal. The programmer can also keep his terminals separated for programming purposes by using an Apply clause in the Environment Division.

Windows in Working Storage

This Apply clause provides for some data name to be used by the terminal. In the Four Phase concept, this variable is used to define a record in working storage. Effectively it makes each screen a window in working storage. This window is accessible by the programs and by the operator at the time of object performance.

Accessing is done by a special extension Key-In. This verb operates asynchronously, so that each terminal can work independently from the others and from the main operational program.

At run time the program accepts data from the keyboard itself.

In the illustrated demonstration program, for instance, the use of this asynchronous program is included in the declarative verbs which head the Procedure Division. In this example, the data is simply moved from the terminal to a specified position on the screen, but more can be performed at this point.

Priorities can be established, for instance. Editing can be performed so that the screen image from the input is checked for error, and is presented in its most understandable form.

After the typed input has been accepted and represented on the screen, the operational Cobol program continues, while the terminal operator can continue giving in more information or await his turn for major processing.

Will It Fit In?

So much for the technical area. Of much more general interest is the position of this input in the standard of Cobol within the standard operation.

For there is no doubt about it—this set of extensions of the current Cobol standard is valid. The right to add extensions to the standard has always been said to exist specifically for such improvements.

Four Phase has been very careful to prepare its Cobol compiler along the lines of the standard. This job was completed quite recently; the first manuals are dated Aug. 1, 1972. At the moment it can correctly be called Ansi Standard Cobol.

But soon, if the plans of the

Extensions to Ansi standard Cobol include calls and the Video feature. These extensions provide:

- CALL USING allows Cobol or assembly language subroutines to be executed in line in the Cobol program.

- USING allows parameters to be passed to subroutines.

- Video feature includes non-file-oriented I/O for controlling video display terminals. Highlight: The APPLY verb allows data-names to be associated with the keyboards and the keyboard control characters. A Screen Section in the Data Division allows any number of screen formats to be defined, with each field being defined on a row and column basis and given a PICTURE. The KEY-IN verb allows the cursor to be placed at the beginning of a field and data to be accepted in that field.

- USE AFTER KEYBOARD DECLARATIVES allow communication between the interrupt-driven keyboards and the main, or background, program.

- USAGE is KEY-IN in the Screen Section allows general alphanumeric-type input to be defined in accordance with its contents instead of its PICTURE.

Summary of Four Phase Cobol Additions

Description taken from System IV/70 Cobol Language Definition Manual which costs \$2.50 from Four Phase Systems Inc., 10420 N. Tantau Ave., Cupertino, Calif. 95014. Also available is the System IV/70 Cobol Programmers Guide for \$2.

Ansi X3 Committee are successful, this innovative compiler can be declared non-standard, just because it does not follow a document that on Aug. 1 was still kept secret from the community.

All copies of the then current X3 document were marked "Working Draft—Document for American National Standard Cobol. Note: This is an internal X344 working document. It is not for external distribution."

Of course, the document was available to the competitors of Four Phase Systems—the big computer manufacturers. Many of them were already building compilers to match the expected new standard. But it was not

available to Four Phase.

In short, here is a promising technique which uses the established way for developing Cobol, which is liable to get cut down by a new standard.

I don't think the methods adopted by the Ansi committee for the development of Cobol are effective for the data processing community. No matter how effective they may be for members of the committee.

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ENVIRONMENT DIVISION CONFIGURATION SECTION. SOURCE-COMPUTER. FOUR-70. OBJECT-COMPUTER. FOUR-70.

SCREEN SIZE IS 24,48.
MEMORY SIZE 8192 WORDS.
INPUT-OUTPUT SECTION.
I-O CONTROL.

APPLY KEY-DATA TO KEYBOARD.

DATA DIVISION.
WORKING-STORAGE SECTION.

01 KEY-DATA.

02 KEYBOARD-NO PICTURE 9 COMPUTATIONAL.
02 TERM-CODE PICTURE 9 COMPUTATIONAL.

SCREEN SECTION

01 FORMAT-1 OCCURS 2 TIMES.
02 COMMAND PICTURE X(13) POS 1,1 USAGE KEY-IN.
02 LINE2 PICTURE X(48) POS 2,1.

02 OVER-90S PICTURE 2(4), 99 POS 12,40.
01 FORMAT-2 OCCURS 2 TIMES.

02 FILLER PICTURE X(142) POS 1,1.
02 MESSAGE PICTURE X(48) POS 4,1.
02 FILLER PICTURE X(384) POS 5,1.

PROCEDURE DIVISION.
DECLARATIVES.
INPUT-COMplete SECTION, USE AFTER KEYBOARD INPUT.
INTERRUPT.
MOVE TERM-CODE TO CHAR (KEYBOARD-NO)
END DECLARATIVES.

CHECK-STATE-END.
MOVE SPACES TO CHAR (INDEX1).
KEY-IN COMMAND (INDEX1).
GO TO TERMINAL-CHECK-2.

Cobol Program Using Video Feature

The above extract illustrates some of the video controlling extensions of Cobol developed by Four Phase Systems. In the Environment Division, a description of the terminals is given, and the controlling data word KEY-DATA is identified. The word itself is defined in the Working Storage section, followed by definition of the screens. Many screen formats can be defined and each format can be used by every screen. In the Procedure Division, the asynchronous terminal handling is provided in the declarative area, while the actual processing is handled by a Key-In command, and then in the normal way by the program.

Can't Blame Everything on the Mails

In the Dec. 6 column Mel Tolhurst of New York gave an example of the letter he sent to various credit card agencies when they billed him for finance charges he thought were not due. He claimed the companies had waited a week from the date of preparation to mail the bill to him, while setting the due date from the preparation date.

In a second column [Jan. 17] I calculated that by charging a month's interest on items paid within three or four days after the due date (as in Tolhurst's case) the real interest rate was more like 80% rather than 18%.

This situation is frequently blamed on the slow mails but one reader's experience suggests another reason. This reader was assessed finance charges even though the money had been received by the bank concerned, cashed by the bank, but simply not posted to the account for six days!

Gay DeBrie of Stanford University was lucky. Not only is he an organized analyst, who keeps the envelopes as well as the bills, but the Palo Alto Bank of California, where she banks, returns checks cashed on the 11th of the month before the 23d. Thus, when she received her Master Charge bill on Jan. 23 she was able to document that the money had not been delayed in the mail, which

would have made the finance charge proper.

As it was, she could see that the Master Charge people had received the money before the due date, had not posted it until

Jan. 17—Second statement date. No credit entered, and balance of \$177.67 subjected to 1-1/2% finance charge of \$2.67.

Jan. 22—Bill mailed from San Francisco

Jan. 23—Bill received, documents collated showing that the money had been paid before the Jan.

12 due date, and a letter sent to the Bank of California, the Redwood City District Attorney, the Redwood City Better Business Bureau and Consumer's Report.

So poor mail delivery may not be the only reason for the many complaints about the finance charge situation. It seems that the situation is open to systematic abuse both ends with the blame placed on the mails.

The Readers Respond

six days after they cashed her check, and had assessed her finance charges. (Incidentally, the charges were rounded by 0.495 up against the customer, just to add insult to injury.)

The dates concerned were:

Dec. 18—Date of statement which fixed Jan. 12 as due date, bill amount \$177.67.

Dec. 29—Bill mailed from San Francisco

Jan. 10—Check made out for full amount

Jan. 11—Check cashed

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The Professional's Viewpoint

CDP Must Protect the Public Interests

(This is an abbreviated version of a paper on "The Future of Certification" presented at the 1972 DPMA Conference.)

By Theodore C. Willoughby
Special to Computerworld

The Certificate in Data Processing does not satisfy the needs of data processing professionalism in the public areas. Strengthening is required in these areas if the CDP is to serve as a professional qualifier.

To see why, one must consider whether DP is a profession.

Professions tend to develop cultures peculiar to their own group. These are often built amid a network of formal and informal groups usually involving their professional associations and schools. They often have relatively unique values, norms and symbols.

Values not questioned by the professional are the intrinsic worth and the social goal of his service. He sees the community welfare enhanced by his work. He is convinced the professional is wiser than the laity and that monopoly serves the public need. The professional believes in rational approaches to the application and enhancement of knowledge in his profession.

Ways of securing clients, challenging theory, grooming a protégé and recompensing a sponsor tend to be normalized in a profession. Professions also develop certain titles, insignia, emblems, dress or other tokens by which they can be discriminated.

Religious Experience

In a sense, entering a profession is analogous to entering a religious order. Work becomes the major purpose of life for the professional. The sanctity of the profession requires that deviants be identified

and culled early in the educational process.

Does DP management know enough about DP to evaluate a DP'er's services?

Consultants in DP can list many cases in their own experience in which the purpose of the engagement was to evaluate the DP staff.

More than half the assignments of one well-known consultant have resulted in the firing of the data processing manager.

Could it be that the typical management/DP communication gap (I can't understand him - he can't understand me) is in part a continuing fight for professional authority on the part of the DP'er? Certainly most practitioners I know would like to avoid the explanation and persuasion currently required.

Current DP'ers don't perceive that they have professional authority, but many would like to have it. One way in which I see it coming is through public demand.

If the public should decide that attestation is needed in any DP area, then some such professional authority will have to be created. Some possible areas where the

public may have an interest in certified products of our work are: annual financial statement attestation, regulation of private and public data banks, voting systems, billing systems, program certification and mail order systems.

Consumerism has enough strength to push through laws in one or more of the above areas. If the laws pass, they are fairly likely to contain some form of required certification, and then the professional authority will be created. As it will have been created by public demand, it will include public safeguards.

Certification programs - like the CDP - will then be acceptable as a center of such "professional authority" if and only if they ensure that public interests are protected. This is not currently so, and it is therefore in this area that the CDP needs strengthening if it is to serve as a professional qualifier.

Willoughby is assistant professor of business administration at Pennsylvania State University. He is a member of the DPMA Certification Council and the Society of Certified Data Processors.

Paranoid Programmers, Do Not Relax Yet--Facts Speak Truth

By Dick H. Brandon
Special to Computerworld

A foul rumor has been making the rounds of late, fueled by a scholarly study by T.C. Willoughby and embodied in a quasi-scholarly article in *Computerworld* (CW, Jan. 3). Under the headline "Paranoid Programmers, You're Really OK," the article attempts to assuage the fears and insecurities properly resident in the normal programmers (a clear contradi-

ction in terms!).

In any event, it is now suggested that the average programmer is no more schizoid than the average musician, and that in fact programmers may be less so. In a dazzling series of syllogisms, the article argues to prove that the fact that programmers do not like documentation clearly demonstrates they are not schizoid.

Wow!

It is a fact that programmers are independent, and often work independently for months at a stretch. It has also been proven (by Dr. J. Whiskin) that the better programmers are more inward directed or introverted, rather than ambiverted or extroverted. When these characteristics are present to excess, paranoia or other milder neuroses result.

The dominant test in the industry is the

Viewpoint

IBM Programmer Aptitude Test, cited as selecting the majority of field entrants in the 1967 CPR study. Now anyone who has taken that test knows it takes a certain gleeful twist of mind to properly construct the spatial relations symbolism, or to know how many chickens can lay 327 eggs in 46-1/2 hours.

Any data processing manager of experience can tell hundreds of stories of erratic, funny, neurotic or paranoid behavior on the part of his development staff. The evidence of one's eyes, not to mention the Connecticut mental institution whose inmates scored higher on the PAT than its programmers, certainly suggests that the time for relaxing is still way off. Thus, in your heart you know I am right. . . .

Please note this is not an attack on programmers (I am one). It is simply an observation of facts and circumstances which lead me to believe that genius programming sapiens is more likely to be or go nuts.

There are many fine non-neurotic and non-schizoid programmers, I am sure, but to ignore the facts is ostrich-like and will not help the industry surmount its many problems.

Anyway, I certainly would stop being paranoid, if people would stop picking on me.

Brandon is president of Brandon Applied Systems, Inc. in New York.

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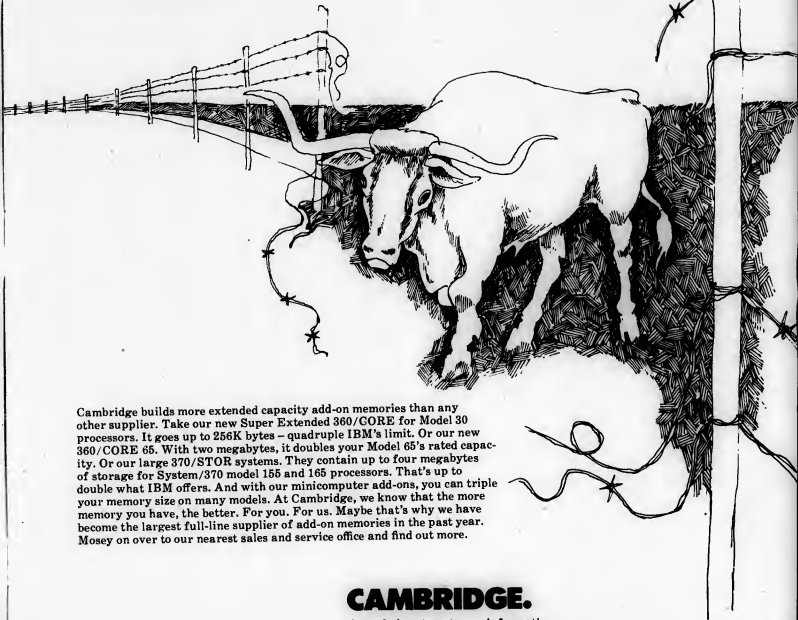
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System IV/70 can serve as a direct replacement for both local and remote IBM 2260 and 3270 Display Systems with monthly savings up to 60% on a 1-year lease.

In addition to providing normal display system features, System IV/70 accommodates extensions for local format storage, single-key message generation, real-time data editing, and local disc backup during central system down time.

Concurrent media conversion with optional system peripherals is also supported for card-to-tape, card-to-print, and tape-to-print.



360/370 Off-Line Key-to-Disc & Remote Batch

SMARTER

System IV/70 can support shared processor data entry with magnetic tape output for less than \$100 per terminal per month on a 1-year lease.

The system provides all the functions of IBM keypunch and key verification equipment plus powerful character-by-character editing and validation features that significantly reduce 360/370 preprocessing.

Conversational operation and large fully formatted displays make the system ideal for source data entry as well.

Output data can either be transcribed concurrently on magnetic tape or transferred directly to an IBM 360/370 through a local channel interface or over communications lines with bi-sync IBM 2780 protocol.

Processed reports are received at line speed and stored on disc for CRT access and hard copy output.



Stand-Alone COBOL Processing

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System IV/70 is smart enough to handle many jobs all by itself.

Its 98K byte CPU has the processing power of an IBM System/360, Model 30.

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And its COBOL compiler features Video Extensions for easy development of both batch and real-time applications.

A typical system configured with COBOL and a 72K byte CPU, 50 million byte disc drive, printer, bi-sync communications, and six 1920-character CRT's with dual intensity and audible alarm rents for less than \$2000 per month on a 1-year lease.



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SOFTWARE SERVICES

Xerox Junks UTS, XOS

'CP-V' Lets Users Mix System Modes

Random Notes

'Less/Time' Uses 8K 1130 For Fast Critical Pathing

HOUSTON - IBM 1130 users at least 8K memories can run critical path scheduling work on their equipment with the Less/Time program from Process Control Specialists Co. (PCS). The package is said to feature simpler input and faster operating speeds than other commonly available programs.

Less/Time is available for license on an 8K 1130 for \$1,000, or on a 16K system for \$1,250. Object code is copied on a customer-supplied disk, and an instruction manual is included. PCS said. The firm can be reached through P.O. Box 22902, 77027.

Dataworld Mounts RJE Payroll System For U.S., Canadian Firms

TORONTO, Ont. - U.S. and Canadian firms can take payroll processing off their in-house equipment and run it through a remote job entry terminal linked into a payroll system developed by Comtech Group International Ltd., and installed on Dataworld Ltd.'s 370/165 here.

The system is being adapted to handle both Canadian and U.S. tax structures. The remote processing protects the sensitive nature of payroll data while the RJE support means the source documents never leave the user's location or control, a spokesman noted. Dataworld is at 650 McNicoll Ave., Willowdale, M3A 2R4.

PDP-11 Operating System Low-Cost, Handles Multitasking

MAYNARD, Mass. - A new small, low-cost, multitasking operating system for PDP-11s has been announced by DEC. Called RSX-11A, the real-time executive is priced at \$750 and is designed specifically for the PDP-11/10, 11/20 and 11/40 computers.

Core usage ranges from 2K to 5K words, but the system relieves the user of writing detailed I/O instructions or of planning timing, data buffering, scheduling, priority handling and other system-related operations. Minimum hardware is a PDP-11 with 4K words, teletypewriter and high-speed paper tape reader/punch.

Colleges Get Accounting Help

ROCHESTER, N.Y. - College and university financial officers can get both managerial reports and traditional accounting information from the same set of input data by using the Financial Accounting System from Information Associates Inc. (IAI).

A flexible subcode structure allows managers to share reports to their needs, within institution-wide parameters, the company said. Installation support for the \$45,000 package includes consultation and training of user personnel, as well as ANS Cobol source code.

IAI is at 20 Union St. N., 14607.

By Don Leavitt
or the cv staff

EL SEGUNDO, Calif. - Xerox Corp. has announced a multi-user, virtual memory operating system to replace both the Xerox Operating System (XOS) and the Universal Timesharing System (UTS) for Sigma 6, 7 and 9 mainframes. First version of Control Program-Five (CP-V) will be available in the second quarter of this year without cost to users, the company said.

When fully installed, the new operating system will be capable of supporting five modes of operation simultaneously: multiprogrammed batch; remote-batch processing; time-sharing; transaction processing; and real-time operations.

Existing application programs are expected to be compatible with the new

operating system, a spokesman said, and CP-V will support sequential, keyed or random access files.

Announcement of CP-V means the ill-starred UTS project (which took far longer in development than Xerox had expected) has reached a stage comparable to the "functional stabilization" of IBM's DOS/360. There will be no further development of UTS, a spokesman said, but installations may continue to use it without prejudice.

Since Xerox is bundled, he added, maintenance of UTS - and XOS as well - should continue to be available as needed and without cost.

To maximize throughput, he said, the multiprogrammed batch mode will accept up to 16 concurrent batch jobs. IBM's DOS, by contrast, operates with a maxi-

mum of three partitions, each of which normally handles one job at a time.

Many Terminals Acceptable

Under the remote-batch processing option, CP-V will accept jobs from a variety of terminals, including IBM 360/20s and University Computing Core 1200 devices. With a future enhancement, scheduled to be available the fourth quarter of this year, CP-V will also accept input from IBM 2780 or compatible terminals, Xerox noted.

Interactive time-sharing, with APL, Basic or Fortran, will support as many as 128 concurrent users, each of whom will effectively have the full power of the CPU available to him.

The transaction processing mode, like remote-batch, is to be implemented in two stages. The basic support will provide the user with the on-line data management system (DMS) that has been a part of the other operating systems for some time.

An interactive data base processing language to provide on-line information retrieval and display from an Extended DMS data base is scheduled for release in the fourth quarter of the year.

Communication facilities for polled, multidrop lines for a variety of terminals will also become part of the transaction processing capability, but only in a future release with an as-yet undiscussed delivery date, the company said.

Support for real-time operations will also be made available toward the end of the year. This mode will provide the capability to handle both real-time and non-real-time tasks. Real-time responses will be less than 500 µsec 99% of the time, a spokesman claimed.

'Mainstream' Backs Common Data, Service Choices for Remote Use

DOVER, N.J. - Remote-computing network users now have another vendor to consider when planning to set up a data base accessible from multiple nationwide locations.

Boeing Computer Services' (BCS) Mainstream service is based on IBM 370 equipment at the BCS data center in McLean, Va., and can be reached by a call to the user's nearest BCS office.

Multiple locations of a single user will be able to work against a single data base and work with identical programs if they wish.

Within Mainstream, users are provided four services. Remote job entry is available in two forms: medium speed (up to 4,800 bit/sec) supported under Hsp and low-speed (to 120 char/sec) backed by the Time-Sharing Option (TSO) on OS/370.

Conversational editing service for file creation, retrieval and modification is also available to users of low-speed terminals.

Finally, local batch service for actual entry of data and jobs is supported under Mainstream, but only at the McLean facility, BCS said.

RJE supports production and compilation requirements of users at remote sites. The Hsp-based service enables the user to treat his intelligent terminal or small-scale CPU linked to the service as the I/O device for the BCS mainframe.

The TSO offering supports multiple concurrent users, each of whom feels he has exclusive use of the system resources. The company has modified IBM-supplied TSO code "somewhat" to improve its effectiveness, but users should be able to move programs from other TSO environments to Mainstream "without any problem," a spokesman said.

Key to the effectiveness of Mainstream, he added, is the BCS-written Job Stream Manager (JSM) which works along with OS/370. JSM processes jobs in accordance with the service time period required by the user, but it also sorts jobs by type and priority to establish an optimum processing rate.

All OS-supported assemblers and compilers, including Fortran, Cobol and PL/I, as well as an array of utility programs and all the OS access methods, are available under Mainstream, the company noted, and the service could be used to replace or supplement a full-scale CPU at a user site.

'Pofus' Focus on Procurement

LA JOLLA, Calif. - Procurement and production managers can ensure that required materials are available as expected, or that they are aware of any delivery snags before they become real problems, with the Procurement Follow-up System (Pofus) now available from Systems, Science and Software.

Improved control over parts orders and subcontracted assemblies is provided under Pofus through two management exception listings: a procurement follow-up report and a procurement late report.

The follow-up list shows, by vendor, all materials due to be delivered in selected time periods in the future. This report can be the starting point for follow-up phone calls to confirm or update the promised delivery schedules.

At the same time the report is

printed, preprinted cards are generated by Pofus for use as turnaround documents by the receiving department to signal when the shipments have in fact arrived.

The system can be run interactively from terminals at the manager's office or work station, or in a batch environment if time is not a critical factor.

The system is written in ANS Cobol and is available as a time-shared service on the company's Univac 1108, or as a package for installation on a user's own system. The largest operation, a sort requires about 27K words of storage on an 1108, but most of the Pofus programs fit in 16K to 15K words, a spokesman said.

It can be purchased for \$4,500 plus cost of conversion to other hardware, including 360 or 370 equipment.

Systems, Science and Software can be reached through P.O. Box 1620, 92037.

For MMS General Ledger Users 1973 Will Be A Vintage Year.

Since January, 7 companies ordered the MMS General Ledger System. Each one of these corporations is worth more than \$200 million (one is in the \$800 million class). They all have the programming staffs and resources necessary to develop their own corporate financial systems. Instead, they chose the MMS General Ledger. A software package. Their reasoning is simple: it costs less to use a proven package (more than 50 users have installed it in the past three years). Also, it fits your needs rather than the other way around.

For these happy users, 1973 will be a vintage year. Call or send in the coupon today. They get ready to join the celebration.

Cheers!




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Data Briefs

Olivetti Terminal Series Includes TPS Language

NEW YORK — Olivetti's DE520 series of remote intelligent terminals is designed to use TPS programming language which has 35 instructions and is said to simplify users' application programming.

DE520 terminals consist of desktop units with read only and random-access memories for data and program storage, a character display screen, alphanumeric and numeric keyboard and a magnetic cassette reader-recorder.

An optional communications interface permits synchronous transmission over the dial network at speeds of 600 to 2,400 baud. Prices of the DE520 systems start at \$6,700. Olivetti is at 500 Park Ave., 10022.

Tycom Expands Terminal

POMPTON LAKES, N.J. — Tycom Systems Corp. has expanded the capabilities of its Holmes Tycom 38-keyboard, send-receive terminal.

The expanded Tycom 38 offers 10 or 15 char./sec. and a 32-character buffer. It also permits full-duplex output of control functions.

With a customer-supplied typewriter, the Tycom 38 costs \$2,350. Delivery is from 45 to 60 days from 750 Hamburg Tpke., 07442.

Techtran Unit Has Dual Cassettes

ROCHESTER, N.Y. — Techtran's Model 4000 Communications Terminal is suited for high-speed data communications and data storage applications.

The 4200 features dual cassettes, full remote control, dual interface (terminal and modem) and switch-selectable speeds to 2,400 baud.

The terminal costs \$3,535. Delivery is 45 days from 580 Jefferson Road, 14623.

CSMA Sets Seminar

WILMINGTON, Del. — The Communications Systems Management Association (CSMA) will hold a one-day seminar at the Marriott Motor Hotel in Philadelphia on March 23.

The seminar will be conducted in co-operation with the Delaware Valley Chapter of CSMA, and will be divided into basic and advanced communications sessions.

CSMA is at 1102 West St., Suite 1001, 19801.

POS Terminals Delivered

NEW YORK — Unitote, a division of General Instrument Corp., has available electronic point-of-sale terminals. All data entered into a Series 302 terminal during off-line periods is captured and later automatically reentered into the store network. The firm is at 3722 MacCormick Road, Cockeysville, Md.

Analysis — Part III

PCI Sets Rates Below Bell, Datran

By Ronald A. Frank
of the CW Staff

WASHINGTON, D.C. — The packet-switching network which Packet Communications Inc. (PCI) has proposed to the Federal Communications Commission differs in several important ways from the message-switched systems now operating on AT&T's lines. The net would also provide users with rates below existing or planned services.

While Bell (and the other existing carriers) typically "dedicate" a circuit to the private-line user, PCI's network will systematically mix the transmissions of one or more users into "dynamically routed" packets.

Existing network users "rarely utilize a circuit more than 10% of its capacity," according to PCI. By contrast, the firm predicts its proposed packet-switching net will achieve "resource utilization efficiency to as high as 80%."

The PCI packet-switched technology "will provide a cost-effective delivery of data within the network both to and from its host computers and their terminal interface points," the firm said. The high data accuracy will be based on the redundant switching methodology of two types of Arpa-like network processors.

Modified minicomputers called Packet Switching Processors (PSPs) will connect the user's host CPU to the projected nationwide PCI network.

The PSPs will accept messages from the user's CPU, "subdivide and reformat these messages into packets and route them to other PSPs serving the destination computer."

Receiving PSPs will verify that the transmitted packets are error-free, and then reassemble them into messages to be passed on to the receiving user's mainframe.

Access from terminals to the various host CPUs in the PCI network will be provided with Terminal Access Processors (TAPs). Each TAP will be connected to the net through a PSP. And remote terminals will be able to access the nearest TAP using conventional dial-up phone lines.

PCI has told the FCC its proposed network will enhance data security compared with "conventional data networks." Users will have complete control over "access to their own systems." And single packets will be interspersed with those of many other messages making it "most difficult for anyone to monitor any single data stream."

While exact rate comparisons between PCI and AT&T are still premature, PCI has provided some possible figures in its application.

\$195 Under Bell

PCI estimates that "a 10M-bit file transmitted on a 2 bit/sec dial-up line for 1,000 miles" would take about nine hours and cost \$195 under Bell interstate

rates, "assuming 15% line usage efficiency."

A private voice-grade line would require two to three hours transmission time at 4,800 bit/sec assuming 25% efficiency over full-duplex facilities, PCI estimated.

The same block of data on the PCI net would be transmitted in four to 20 minutes and would cost between \$20 and \$40, depending on monthly data volume transmitted by that computer.

Using a second example, the PCI application described a user transmitting 2,000 blocks of 100 bits each day. Dial-up services would require an estimated 11 hours "just to dial up and hang up," PCI said. And a leased line across 500 miles for this application would cost about \$35/day, excluding the cost of equipment.

The same data load using the switched 4,800 bit/sec service proposed by Datran would require about 1.6 hr/day waiting for access and disconnection and would cost "about two cents per transaction," or about \$40/day, PCI estimated.

The same set of transmissions would cost only about \$4 to \$8/day on PCI's proposed net, the company said.

If given FCC approval, PCI said "customer installations will begin approximately nine months after initial lines and equipment are ordered." If regulatory approval is obtained in June 1973, customer installations could begin as early as the spring of 1974, PCI said.

Wavetek Audio/Data System Can Save 50% Over IBM's 7770

SAN DIEGO — Wavetek Data Communications has introduced its ADC1000 audio/data communications system which provides audio-response outputs from Touch-Tone phone inquiries. The system can simultaneously handle teletypes and CRTs, and costs about 50% of a comparable IBM system, the firm said.

The ADC1000 can operate as a direct replacement for the IBM 7770 Model 3 audio-response system, as a remote on-line teleprocessing system using private line or dial-up facilities to a CPU, or as a front-end processor tied to a mainframe emulating IBM 2848 or 270X controllers. The unit can also function as a stand-alone system using tape or disk storage.

Up to 192 Ports

The DEC PDP-11 system processor contains the control program to handle up to 192 audio/data multiplexer ports. Each of the ports consists of a Bell 401 or 403 data set (or independent equivalent) and the control circuitry to detect incoming data.

The port controller provides an answer

tone, and either an Ascii or voice-response answer to the inquiry. The system can handle all key-type telephone signals which generate two-out-of-eight tones.

The ADC1000 can be interfaced to 360/370 mainframes through either the selector or multiplexer channels or through serial data connection to other CPUs. The voice answer-back unit can store a vocabulary of up to 248 words or phrases, each of which is contained on a magnetic addressable track.

The ADC1000 control program allows the user to add a remote telecommunications capability at no cost and without programming changes. Wavetek said. The ADC1000 can handle hard copy/CRT response transactions with "any terminal devices using Ascii transmission code and operating at 110-, 1,200- or 2,400 bit/sec."

A typical system including 12 lines with 64-word vocabulary and 12 data sets costs about \$55,000 or \$11,000/mo. A comparable IBM 7770 system would cost about \$2,600/mo, a Wavetek spokesman said. Wavetek is at PO Box 651, 92112.

Court Overrules FCC On Carrier's DP

WASHINGTON, D.C. — The U.S. Court of Appeals has reversed a portion of the Federal Communications Commission's Computer Decision and ruled that data processing affiliates of common carriers may serve both regulated and non-regulated customers.

In a related point, the court said DP affiliates may use the name of the parent common carrier.

The original FCC decision had ruled that data processing operations of the carriers had to operate as wholly separate companies.

One firm that had challenged the FCC decision is Computerservice, Inc., a subsidiary of Mankato Citizens Telephone Co., Mankato, Minn.

"This means that we can now expand and go out and get more customers," said how Peter Ferguson, senior vice-president of Mankato, reacted.

A spokesman for the Association of Data Processing Service Organizations (Adapso) called the court ruling "satisfactory" and said there would be no problem if the DP affiliates serve both regulated and non-regulated customers on an equal basis.

Now...get both in one... a batch terminal and a time sharing terminal.

No longer is it necessary for the batch terminal user who has a need to access a local time sharing system to maintain a simple, low-speed terminal just for this purpose in the same office. Sycor now has eliminated this expense by adding low speed (100-300 baud) asynchronous communications capability to its Model 340.

A Sycor 340 user can access any major time sharing system, input the problem, receive the solution, and continue with the data entry operation. Captured data then can be batched to the central computer facility at

1200-4800 baud speeds using IBM-compatible BSC procedures.

In addition to this unique dual communications capability, Sycor provides users with T.A.L., a programming language developed specially for data entry applications. A wide choice of peripherals also is available—printers ranging in speed from 30 cps to 200 lpm, 7 or 9 track magnetic tape drives, and a 250-cpm card reader.

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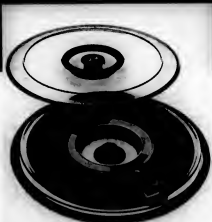


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Bits & Pieces

Independents Offer S/3 Users OCR Entry Techniques

NEWTOWN, Pa. — Two independent suppliers have joined forces to offer IBM System/3 users an off-line system incorporating optical character recognition (OCR) techniques to read documents and a punched card unit to reformat data to 96-column punched cards for input to the system.

The Opscan 17 Source Document Reader — from Optical Scanning Corp. — reads hard printed numeric characters, ordinary printed marks and machine-generated printing forms and documents of varying sizes, a spokesman said.

This OCR unit is interfaced to one of Decision Data Corp.'s 96-column punched card units — the 9601, 9610 or 9660 data recorder, the spokesman said.

Purchase prices for the Opscan-Decision Data combinations range from \$12,950 to \$19,220 exclusive of maintenance. Systems are also available on a lease basis at monthly rates ranging from \$360 to \$575 including maintenance.

360s Get 370 Peripheral Capability
SAN FRANCISCO — Ite Corp. has produced a field-installable device capable of converting an IBM 2840 Selector Channel to a 370-like Block Multiplexer Channel (2880).

The resulting conversion permits users 360/65s and up to attach 370 peripheral devices (such as Ite's 7330 disk subsystem and 7305 Fixed Read Files) without software changes, a spokesman said.

The feature will be available in July on a minimum two-year lease term.

Printers Offered Mini Users

DARLEN, Conn. — Digital Associates has unveiled a 135/300 line/min dot matrix printer and a 16 horizontal/scan/sec 1 to 924 dots printing plotter, which is compatible with most minicomputers, according to a spokesman for the firm.

Lease prices for the DAC-3000 series printer system start from \$128/mo plus maintenance; purchase prices start at \$5,740.

Lease price for the DAC-3050 series printer/plotter starts at \$200/mo plus maintenance.

Maintenance is through the firm with headquarters at 1031 Post Road, 16820.

For Users Who Abuse Minis . . .

CUPERTINO, Calif. — The 1602 Rugednova is a redesigned Data General Nova series minicomputer built by Rolm Corp. to meet military specifications for severe environment applications such as ship-to-ship missile fire control, glacial field mapping, navigation systems and airborne applications.

The 16-bit general-purpose machine features a core memory cycle time of 1 μ sec and is upward-compatible with Rolm's previous 1601 and the Nova series minicomputers, a spokesman said.

Price of the 1602 — CPU and 8K of core memory — is \$18,500. Typical I/O cards range from \$1,500 to \$1,600.

Documentation and software packages are available from 18922 Forge Drive, 95014.

Fairfield Installs First 7065

MILLWAUKEE — Fairfield Memory installed its first MF Model 7065 core address unit at Northwestern Mutual Life Insurance Co.

The 500K-byte installation brings total system memory size to 2M bytes.

The 7065 unit is offered as replacement and add-on memory for IBM 360 models 65, 65 MP, 67 (Simplex) and 75.

The 7065 provides up to 2M bytes of memory in one unit with off-line servicing and built-in memory tester.

Fairfield is at 1792 Kaiser Drive, Irvine, Calif. 92664.

SYSTEMS & PERIPHERALS

Analysis: IBM's Multiprocessing 370s

• New Life for Big 360s • Added Memory for 145s In MP Configurations Confuses Disk Attaching

By Michael Weinstein

Larger models within the IBM 360 series can be used in the new multiprocessing (MP) configurations announced by IBM (CW, Feb. 7).

IBM's announcement detailed two types of configurations permitted through Release 2 of OS/VS2 — tightly coupled and loosely coupled.

A loosely coupled configuration is defined as "multiple systems interconnected by one computer providing overall control — yet remaining available for applications processing."

In essence, one computer acts like a traffic cop directing jobs to and from other computers in the complex with the ability to assign jobs to itself.

While there is an absolute criterion which can perform the traffic cop function — 158s, 168s and larger 145s with memory sizes large enough to support OS/VS2 Release 2 — the restrictions are not so stringent for computers which can act as application units.

Any 360 system large enough to support IBM's Attached Support Processor (ASP) Version 2 and OS/MTV can operate within the loosely coupled complex.

For a 360 to meet this requirement it must be configured with a minimum of 512K bytes — from the 360/65 on up. The restrictions on the 360 in this mode are:

- It can never act as the traffic control unit and can only act as an application unit performing tasks assigned from the larger 370 computer.

- It is doubtful the 360 system can share peripherals with the other 370 computers in the net.

The release of memory expansion modules for the 370/145 has in effect created three architectures: models with memory to and including 256K bytes; memory over 256K bytes to 512K bytes; and memory over 512K bytes.

Any 145 user who wants his machine to have more than 256K bytes of memory from IBM must have a 3345 Storage and Control Frame added to his mainframe to hold the additional memory.

As an option he can include the Integrated Storage Control (ISC) physically into the 3345. The ISC allows the user to connect the 3330 series disk storage subsystem.

Thus models needing the 3345 are those with memory sizes of 384K bytes and 512K bytes.

Any user with a 145 with up to 512K bytes of memory can optionally have the Integrated File Adapter (IFA) incorporated into the central processor if he wishes to use either 2314 or 2319 disk subsystems.

Users who take advantage of the new release expanded IBM-supplied memory for the 145, to a 1M-byte maximum, must undergo a field conversion in which IBM engineers replace the rear frame of the computer with a new frame to hold all memory physically.

Possible confusion results from the fact that the part removed contains the 3345 and the ISC.

In the large models (over 512K) these features are included directly in the memory which is physically in the CPU mainframe.

For the user this means that with the larger 145s he still can operate with 3330 disk subsystems.

With the 145 over 512K bytes he cannot operate with 2314 or 2319 disk subsystems, a spokesman said, as larger units will not incorporate the required IFA.

Honeywell Adds 2030A, Disk Features

WALTHAM, Mass. — In a triple feature announcement, Honeywell added a purchase-price cut, a low end of the Series 2000, increased access and retrieval capabilities for the Type 277 and Type 279 disk subsystems and unveiled additional main memory that doubles the previous capacity of the models 2050A and 2070.

The Model 2030A (purchase-only) is designed to provide a growth path for Series 200 users and will compete with outside systems in the IBM System/3 class, the firm said.

OS Multiprogramming

The 2030A features multiprogramming under the OS/2000 operating system and is available with the Datatrac 2000 front-end network processor for communications applications.

Minimum memory size is 41K characters with cycle time set at 2 μ sec for each 6-bit character. Memory can be increased in seven varied increments to the maximum of 198K characters.

Users of the 2030A can add a power module for an additional unbuffered sector to permit a total of 1M characters to be transferred in up to eight simultaneous operations over 12 read/write channels.

Cycle time can also be speeded up from the standard 2 μ sec to 1.6 μ sec.

Options include a buffered adapter for 277 disk pack drives, interval timer, 8-bit transfer capacity, expansion of disk control capacity from four to eight disk pack drives and a unit for floating-point arithmetic.

Field Upgrade

The difference between the 2030A (purchase-only) and the previously released 2030 (lease or purchase) is that the "A" model can be field-upgraded to increase memory beyond the limit of the leased machine.

Maximum memory on the leased or purchased 2030 is 98K characters while

the 2030A can be expanded to 196K characters.

A new access/retrieval technique allows two information transfers to take place simultaneously on a single 277 or 279 disk storage subsystem, a spokesman said.

The Dual Access Storage Handling (DASH/2000) package can be added to existing 277 or 279 disk-oriented machines operating under OS/2000 without modification to existing programs, he added.

DASH/2000 provides buffered transfer rates of between 167 and 500 kchar/sec, as well as error detection and correction capabilities.

Doubling the Memory

Maximum memory for the models 2050A and 2070 — previously 524K characters each — has been doubled to 1M.

Mixed-Vendor Shop Lets School Boost Capacity, Save Time, Money

MIAMI — Going to outside sources to augment its IBM 370/155-based system has led Miami-Dade Junior College to forecast savings of \$271,000 over a five-year period while doubling the capacity of its system, according to Floyd Howell Jr., director of computer services at the school.

"We wound up with 33% more memory, a 60% increase in tape speed and twice as many disk drives as before," Howell commented.

"We are a mixed-vendor shop," Howell stressed, "with an IBM 370/155, IBM controllers, card readers and keypunches. We also have Bunker-Ramo video display terminals, ICC modems, Datel terminals, Mohawk data recorders, and now the first installation of a Telex Monolithic Memory of 1M byte."

"Additionally, we have installed Telex

characters with a single standard increment.

Purchase prices for the Model 2030A range from \$101,300 for a basic CPU with 40K characters of main memory and a cycle time of 2 μ sec to \$230,480 for the 196K machine.

A typical system with 40K-character memory, console, 18.4M-character disk subsystem, card reader/punch and 650 line/min printer costs \$209,110.

DASH/2000 leases start at \$1,016/mo — on a five-year contract — for the Type 277 units, and \$1,321/mo for the Type 279 above the rental for the disk drives.

A basic 2050A with 1M character of main memory sells for \$637,932. The 2070 with 1M character memory leases for \$25,175/mo on a five-year contract or sells for \$1,060 million.

Deliveries will begin in April 1973.

Mixed-Vendor Shop Lets School Boost Capacity, Save Time, Money

disk drives, tape drives and printers," Howell explained.

The rationale for mixing, according to Howell, was to provide the added services needed in the most economical way presented.

A Stitch in Time

Increased capacity has also saved time, the computer director related. "Transcript files used to take eight hours to run, now we run them in two hours. We used to have a bottleneck in student completes. This year we didn't have any."

Services maintained by the computer center include the college's financial system (accounting), admissions and records (registration, report cards, transcripts), library testing, property control, personnel and payroll, student completes and APL, a programming language developed by IBM.

The trouble with statistically tested parachutes should be obvious.

We think the same thing holds true when it comes to computer tape.

We make Epoch 4. And we've just never been able to bring ourselves to test it statistically.



A lot of manufacturers don't feel that way.

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That's why every reel of Epoch 4 is 100% certified.

And that's one of many reasons why Epoch 4 is the finest tape buy on the market today.

Mistakes happen.

The difference is, Graham Magnetics doesn't sell them.



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Buying Already-Written Packages Has Its Advantages

By David E. Ferguson

Special to Computerworld

The System 3 user, operating within an unbundled marketplace, has to pay for every bit of software in some fashion. The application packages he buys or has built for him can pose significant problems of cost justification, system adaptation and maintenance.

Strangely, the large system user tends not to buy as much software on the outside as his small system counterpart. This is because the programmer in a large company has more steps between himself and the person with ultimate fiscal responsibility.

Furthermore, there is a strong not-invented-here factor in almost all large programming departments. They think of themselves as "sophisticated" pioneers. They firmly believe no one quite understands their problems and the solutions must be unique. The objectives of technical recognition and the company's profit and loss are not usually mutual.

On the other hand, in small companies the data processing manager is closer to his fiscal management. He is much more cost-conscious and more aware that his employment is dependent upon his company's profitability.

Therefore, it is important that the small system DP manager not only carefully identify the application packages he needs, but he must cost-justify them as well.

Part of that cost justification is going to depend greatly on how you plan to acquire the package.

You can build it in-house, but this poses inherent problems in some instances. It is expensive and it takes a highly trained staff. It poses severe problems in workload distribution because requirements are extremely high at installation time and then taper off or even disappear. Big corporations meet these peaks and valleys by hiring and firing, but that answer is not generally acceptable to smaller firms.

This, of course, does not mean you should definitely not build a package in-house. It may be the only route open to you provided it can be cost-justified.

Another method is to have the package built on the outside on either a time and material or fixed-price basis.

This also poses problems. It's not much cheaper and you lose a certain amount of dedication and motivation in the process. If you're purchasing the package on an hourly basis, your vendor is not being pushed to complete the job in an expeditious manner. And, in some areas, the talent just isn't available at any price.

Fixed-price contracts can protect you against runaway costs, but can, on the other side of the coin, get you into legal problems.

Purchasing already-written applications packages is, by far, the most simple answer to the problem, although you must realize you are going to have to make compromises. In other words, you will have to make changes in your system to meet the package rather than the other way around.

Evaluate what changes you are going to have to make in your system to meet the requirements of the package.

There are a number of advantages, however, to purchasing a package as long as it solves or nearly solves the problem.

- **Low Cost**—development expenses are amortized over a number of sales.
- **Fast delivery**—the package already exists (but be certain to buy packages, not promises).
- **Reliability**—packages, like fine wine, improve with age. Since there is no deterioration, a repair improves the product, unlike a mechanical device where a repair merely attempts to restore it to its original condition.
- **Chance to see before you buy**—often a demonstration can be arranged before you commit. Failing this, you, at least, have the chance to talk to other users. Finally, there is the chance that some independent party has evaluated the

package. So you are not buying cold.

If you think there may be a package to solve your problem, a number of sources can help find these packages.

First of all, IBM has several program products, field-developed packages and

The Small Systems User

installed user programs. Your IBM salesman will be more than cooperative in describing them to you.

The National Association of System/3 Users (Nasu) offers its members several user-supplied applications which are distributed in source listing form with complete documentation for a small charge.

Group/3 offers a few utility programs in loadable program form with complete documentation, some of which are available to non-subscribers of Group/3 services.

International Computer Programs (ICP) Quarterly has a large list of software

packages for all kinds of computers including the S/3. This list is available on a subscription basis.

Suppose you have found a package and have determined it would satisfy your requirements. How do you evaluate it? Ideally you would arrange for a demonstration. Unfortunately, unless you are close to the vendor, or at least in a major metropolitan area, this usually cannot be done. The next best thing is to get references.

If the vendor is hesitant about providing references, be leery. Either he hasn't sold any of the packages and you're the guinea pig or he's sold a few and he doesn't want you to know about them.

In other words, don't be a pioneer. Let the vendor develop and debug his package either on his own or somebody else's time. As far as I'm concerned, a pioneer is a man with arrows in his back.

Inspect and understand all the documentation.

Be certain you have a strong maintenance agreement. If anything goes wrong,

you want the assurance that the vendor will be around to help and that he will solve the problem in a reasonable turnaround time.

The type of contract you negotiate is important. Generally, the one-time payment type of contract can not only strain a company's cash flow but could mean the vendor wants all his money in front. And that could mean he's in a cash bind and may not be around for too long.

Be certain, in monthly payment contracts, that the length of the time period is clearly spelled out and that you understand how the vendor is protecting his proprietary rights.

If possible, find an objective third party to evaluate the package within an environment similar to your own.

Datapro offers evaluations of software products on a subscription basis. The firm can be reached at P.O. Box 346, Moorestown, N.J. 08057. Also, the Group/3 Journal periodically publishes evaluations of software products.

Ferguson is president of Group/3.

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Utilizing the most advanced data recording technology in the industry, the TELEX 6330 Disk Storage Subsystem offers outstanding through-put advantages via industry standard features of Rotational Position Sensing (RPS) and command retry. In addition, the TELEX 6330 subsystem has an advanced functional capability which frees the controller during the format write operation. This advanced capability, secondary disconnect, can yield greater through-put compared to a standard 3330 subsystem.

The 100 megabyte capacity of each TELEX drive is achieved by the use of 404 cylinders per pack with 19 tracks per cylinder and 13,030 bytes per track. The TELEX closed-loop servosystem and electromagnetic actuator use the latest technology solid state electronics. These technologies provide the user with average access times 10% faster than the 3330 (27ms vs. 30ms) and track-to-track access times 30% faster (7ms vs. 10ms).

The TELEX 6830 Storage Control Unit is functionally compatible with the block multiplexor channel of the System 370 and is also available for the System 360 Model 65 and above. This advanced control unit utilizes the latest technologies in MSI and LSI circuits to lengthen component life, minimize service time and insure increased availability. Self-

contained microprogrammed diagnostics speed isolation of potential failures and allow for drive failure analysis concurrent with normal control unit operations.

All of these advantages are available at substantial cost savings and backed by the largest and most experienced field service network in the peripheral industry.

The TELEX 6330 Disk Storage System, delivered in October of 1972, is available for immediate delivery.

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SUMMARY: The TELEX 6330 Disk Storage Subsystem is functionally compatible with IBM System 370 or System 360 Model 65 and above. Capacity of 100 million bytes per drive, and up to 32 drives per controller provides users with a maximum of 3.2 billion bytes of storage per subsystem. Average access time is 10% faster, and track-to-track accessing is 30% faster than the 3330 system. Using standard 3336 disk packs (or equivalents), the TELEX system also features convenient waist-high loading plus low power consumption and low heat generation. All of these features are available at substantial savings.

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- 02 Manufacturing—Computer or data system hardware, peripherals, other associated mechanical devices
- 03 Manufacturing (other)
- 04 Utilities/Comm. Sys./Transport.
- 05 Wholesale/Retail

- 06 Finance/Insurance/Real Estate
- 07 DP Serv. Bureau/Software/Plann.
- 08 Business Services (except DP)
- 09 Education/Medical/Legal
- 10 Federal, State and Local Govt.
- 11 Communications/Printing/Publ.
- 12 Other

YOUR FUNCTION

- 01 Corporate Officer
- 02 Data Processing & Other Operational Management
- 03 Data Processing Professional Staff
- 04 Consultant

- 05 Lawyer/Accountant
- 06 Engineering—Mgmt. Scientific/R&D
- 07 Sales/Marketing/Account Exec.
- 08 Librarian/Educator
- 09 Other

2. Please check the appropriate city:

Washington, D.C.	Feb. 20-22 (Tues, Wed, Thurs)
New York	March 5-7 (Mon, Tues, Wed)
Atlanta	March 13-15 (Tues, Wed, Thurs)
Houston	March 20-22 (Tues, Wed, Thurs)
Anaheim	March 27-29 (Tues, Wed, Thurs)
San Francisco	April 3-5 (Tues, Wed, Thurs)
Kansas City, Mo.	April 11-13 (Wed, Thurs, Fri)
Chicago	April 17-19 (Tues, Wed, Thurs)
Cleveland	April 24-26 (Tues, Wed, Thurs)

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Muehlebach (Hotel Rooms)
Conrad Hilton Hotel
Conventium Center (Forums & Exposition)
Sheraton Cleveland (Hotel Rooms)

3. Check the day(s) you will attend the Forums.

- ☐ Day 1—Data Entry—9 am-2:30 pm
- ☐ Day 2—Data Communications—9 am-2:30 pm
- ☐ Day 3—Installation Management—9 am-2:30 pm

NOTE: Afternoon Sessions are open to all—free of charge

4. Your enclosed check will cover all workshop materials, luncheon, Forum admission and admission to the Exposition Hall (make checks payable to "The Computer Caravan")

- ☐ One Day—\$25.00
- ☐ Two Days—\$50.00
- ☐ Three Days—\$75.00

All Tickets will be held in your name at the door

Exposition only tickets (no forums or luncheon) are \$5.00 and should be purchased at the door (ticket good for all three days).

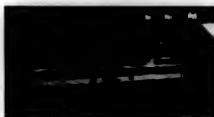
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SPACE SAVER

FOR THE 1973 COMPUTER USERS' FORUM & EXPOSITION—The National Computer Conference that's coming to you.



If you're interested in more efficient EDP operations, then you should be reserving your space right now for The Computer Caravan/73 Users' Forums. This unique program will soon be in a city near you—with shirtsleeve workshops, panel discussions, user-oriented experts, and an exchange of information that will benefit you and your company.

Each day of the three-day show will feature a different topic. You'll be able to air your problems, and learn how others have solved theirs. You'll ask questions, give opinions—and get answers. And you'll come out of the Forum with some new ideas on making your EDP operation more efficient.

FORUM TOPICS

- Day 1—Data Entry
 - Including panel discussions and workshops on:
 - Keypunch Replacement (shared processor)
 - Intelligent Terminals
 - OCR
 - Direct (on-line) Data Entry

Day 2—Communications

Four panelists will discuss two top issues:

- a) Data Transmission
- b) leased lines/broadband
- c) Equipment Selection
- d) communications processors
- e) control equipment (terminals, modems)

Day 3—Installation Management

Panel discussion on management aspects and workshops on specific techniques in the following areas:

- Personnel, recruiting and training
- Programming management
- Independent Peripherals
- e) memories
- b) other peripherals



Forum Attendance is limited

in order for the Forums to work, attendance is strictly limited. So don't wait too long to save your space.

OPEN SESSIONS

New for this year, we'll be conducting open sessions each afternoon for anyone who wants to attend. Each day at 2:30 a different subject will be opened up for discussion and controversy. Here's the schedule.

- Day 1—Data Communications Planning
- Day 2—Software Evaluation Panel
- Day 3—Small Systems Panel

EXPOSITION

The expanded Exhibit Floor will be open from 10 to 6 each day. A variety of leading companies will be there with their latest EDP products and services. And you'll have plenty of time to look at everything that interests you. It's an excellent opportunity to stay ahead of this fast-moving industry. And if you have to make decisions, you should be there. (Advance registration is not required for the Exposition.)

The
Computer
Caravan/73



COMPUTERWORLD
THE WEEKLY FOR THE COMPUTER COMMUNITY



Programmers Are People?

NEW YORK—DP managers may gain some insight into programming as an activity being done by real people (and not just "programmers"), and learn how to use this insight to advantage, through a new two-day professional seminar offered by the Association for Computing Machinery (ACM).

Unlike many seminars, this one will be concerned with how programmers approach their work regardless of the particular project they are handling.

The seminars will be led by Prof. Gerald Weinberg and Daniel Freedman of the State University of New York and will begin at the New York Sheraton on March 1 and 2. They will then be presented in six cities, including Washington, Chicago, Albuquerque, Los Angeles and San Francisco, later in March and in April.

Weinberg's book, *The Psychology of Computer Programming*, will be the mainstay of the "course" and will be distributed to all attendees along with supplementary materials. The seminars are open to ACM members, and to members of DPMA, IEEE Computer Society and the Canadian Information Processing Society for \$190; nonmembers may attend for \$235.

ACM is at 1133 Avenue of the Americas, 10036.

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Limited Funds Threaten Swapped Program Quality

The Data and Program Library Service for the Social Sciences (DPLS) of the University of Wisconsin in 1971 undertook a formal project entitled a National Program Library and Central Program Inventory Service (NPL/CPIS) for the social sciences. The object was to accelerate the exchange of programs that DPLS had been en-

couraging informally for some time.

With National Science Foundation support, project administrator Prof. James F. Taylor set goals including (1) drawing up a

comprehensive inventory of program resources and the distribution of this inventory in the form of indexes and abstracts; (2) maintenance of quality control of programs, particularly standards of debugging and documentation; (3) direct distribution of programs and their documentation; and (4) adaptation of programs to varieties of hardware configurations beyond the original one.

Quality Control Lags

During its first two years of operation, NPL/CPIS has made considerable progress regarding goals (1) and (3), substantial progress on goal (4) but only minimal (if any) progress on goal (2).

Indexes and abstracts are available and programs have been distributed by developers listed in the writings. The adaptation effort, to make offered programs more usable, has generally involved stripping features peculiar to a given compiler and recoding to get the same effect with features that are common to most implementations of a language.

The quality control effort has been hampered largely because the limited resources of the project have just not been allocated to this objective. The project leadership has had to assume, in effect, that the programs do what the developers say they do.

The current NPL/CPIS index contains entries in the following format:

1. Coding system explanation for abstracts in key word and author index.
2. Table of contents of key word and author index.
3. Key word and author index.
4. File number index.
5. Address addendum for the complete addresses of program sources.

For Example

One abstract may give the reader an idea of the breadth of programs covered in the index: STATJOB, An integrated system of statistical programs. CROSTAB1, Cross-tabulation and contingency-table analysis. DSTAT2, Missing-data correlation-analysis. REGAN2, Multiple linear-regression-analysis. STEPREG1, Stepwise multiple linear-regression-analysis. ONEWAY1, One-way analysis-of-variance, fixed or random-effect model. TWOWAY1, Two-way analysis-of-variance, fixed or random-effect or nested model. NWAY1, N-way analysis-of-variance. FACTORI, Factor-analysis.

Language—Fortran IV, Univac, Univac 1108 Assembler, Univac 1108 Exec 8. UWCC—University of Wisconsin, Pub. 4000. File Number—000001, Category—123400.

Copies of the index and abstracts can be requested from the project administrator, Room 4430, Social Science Building, University of Wisconsin, Madison, 53706.

Couger is professor of computer and management science at the University of Colorado.

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La Caravane arrive



Computerworld's French market Computer Caravan is a French show. Because it's being co-sponsored by the leading French Computer publications, *Zero-Un Informatique*. With the leadership of *Zero-Un*'s widely respected monthly magazine and weekly newspaper, French market computer users will know they're getting an Exposition that is uniquely theirs. We'll be conducting The Caravan in local hotels, and orienting the user Forums to accommodate the needs of French market users.

This combination of French control, French publicity and user-orientation will draw thousands of important EDP buying influences as we travel to six cities in 2 countries. And these people are part of one of the most rapidly growing computer markets in the world. Here are some of the figures, according to a recent survey by International Data Corporation:

Overall 1971 EDP Expenditures \$1.48 billion
Projected increase for 1972 8.1% (1.6 billion)
Projected increase for 1973 14.5% (1.83 billion)

Submarket projections:

Data Entry equipment (especially key-to-tape, key-to-disc) is projected for a 28% increase in 1973.

Data Communications Terminals and Control Equipment expenditures are expected to go up 40% in 1973 to a total over \$27 million.

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CI Notes

CLA Looks Into 360 VS

NEW YORK—The Computer Leases Association (CLA) has selected Compaq, Inc. to report on the efforts to provide virtual storage capability for users of IBM 360s.

"There appears to be enough interest by potential suppliers of this capability so users of the 360 will definitely have a choice of virtual storage options if the near future," according to James F. Benton, executive director of CLA. "Compaq has been commissioned to determine the state of the art, catalog the techniques being considered and identify possible suppliers," he added. "The report should help users determine if this kind of enhancement is cost-effective for them."

Million Dollar Software Growth

INDIANAPOLIS, Ind.—The number of proprietary computer software products that hit the million dollar mark in sales has doubled in the past year, according to a study by International Computer Programs, Inc.

Of the 60 such "best sellers" 27 are data-based applications, five are algorithm-based systems and the rest are "systems software, information retrieval systems, programmer and data management aids," according to the report.

"Each and every one of these systems is aggressively marketed, oversupported, firmly and continually enhanced," noted Larry Welke, president of International Computer Programs, Inc.

Supershorts

Control Data Corp. has ordered over 1,100 2,400 bit/sec modems from Tele-Dynamics division of Ambac Industries, in what is one of the largest single orders for this type of modem. The total, 90% of which will be delivered during the first year, will be used on the Advanced Logistics Systems contract, valued at \$83.4 million, from the Air Force.

General Automation will integrate the Tally Corp. 2000 series of line printers in its product lines, according to a recent agreement between the two. Both 125 and 200 line/min printers are covered by the agreement between the mini maker and printer firm.

Atlantic Software Inc., Philadelphia, has expanded the marketing of its Project Control/70 system to Canada with the first order for General Motors in Oshawa.

Digital Equipment Corp. has formed a telephone industry marketing section within its Deccom data communications product line.

Westinghouse Management Systems SA will market Innova Data Processing's Fast Dump Restore software package in the European Common Market.

NCR has assigned its data centers the responsibility of marketing NCR micro-form systems and services.

University Computing Utility Co. has licensed Software Products Co., Ltd. of Hong Kong to market UCUCV Duo 360/370 software package in Japan.

Computer Devices Inc. has been awarded use of the word Teletext in connection with its products. Delta Data has discontinued all use of the similar word Teletem.

Over Next Five Years

Terminal Shipments May Hit \$8 Billion

By E. Drake Lundell Jr.

of the CW Staff

NEWTONVILLE, Mass.—A burgeoning data communications market will see the value of computer terminals shipped over the next five years equal to \$8 billion to \$10 billion—or the equivalent of the total domestic 1972 computer shipments of all types, according to a report issued here by International Data Corp. (IDC).

"The portion of general-purpose computers that uses general-purpose terminals is increasing rapidly, especially in the smallest and largest CPU classes," observed C. Oakley Metz, director of IDC's corporate planning service.

"Over the next five years, this portion will grow from its present 25% level to 30% of total general-purpose CPUs, and the total number of general-purpose terminals attached to them will increase 26% per year (compound growth rate) to 944,000, with the bulk of this growth

among processing (intelligent) terminal models," he added.

Special Trend

But even more important, according to the study, is the increasing trend toward special-purpose terminals, unique to specific applications such as point-of-sale, stock quotation, bank teller and credit-verifying.

This base will experience a snowballing growth rate, according to the report, as application-unique terminals become popular. The start growth rate, however, is purely dependent on the number of good ideas that catch on, the report noted.

The interconnection equipment market presently shows a different picture. The study predicted significant erosion of the modem market, but estimated substantial growth for communications controllers and processors.

Rand's Direction Slowly Changes Toward Social Application Areas

By a CW Staff Writer

SANTA MONICA, Calif.—Rand Corp. is turning its computer from swords and making them into plowshares.

The organization, founded and nurtured for years by Air Force contracts, is directing many of its talents, especially in the DP field, toward more civilian-oriented research.

The move is part of a broader realignment of national priorities and the priorities within Rand, according to John Farquhar, associate director of the Information Sciences and Mathematics Department.

The "think tank" will apply its computer expertise in the area of social demonstrations or experiments conducted by the department and other sectors of Rand, he indicated.

For example, he noted, the department is undertaking a study in the health-related research area in which it is trying to define the clinical information needs of alternative systems of health care on a large scale.

Similarly, a program under which parents are given education vouchers to purchase education for their children will need computer power to succeed.

The computer support for these large-scale experiments includes research on the manipulation of large-scale data bases. In undertaking one of these social experiments a large amount of data is generated and the job of the Information Sciences Department is to devise ways to measure the effectiveness of the program from this huge amount of data.

There is also a great deal of work under way on the privacy and security questions that follow with such information.

"If you cannot guarantee security and privacy of the information in the large

data bases of very personal data about people, they will not respond fully and freely to the questionnaires used for the research," Farquhar indicated.

Presently, he said, research at Rand is split into three parts with one part devoted to the Air Force, one part to other defense-related research and the final part to civilian and social studies. Studies named by such agencies as the National Institutes of Health and the Department of Transportation.



The staff of Shukan Computer joins Computerworld Publisher Patrick J. McGovern and (to his right) Shukan President Hideo Hirayama after signing the agreement launching the joint venture publication.

CW, Dempa Launch New Weekly

TOKYO—Shukan Computer, a weekly newspaper for Japanese computer users, has been started here by Dempa Computerworld Co., a joint venture of Dempa Publications, Japan, and International Data Corp., Computerworld's parent corporation.

Shukan Computer (Computer Weekly) will have an initial circulation of 35,000, of which approximately 80% will be users and 20% industry figures, according to Hideo Hirayama, president of the new publishing company.

The weekly will draw on the worldwide editorial resources of both Dempa, a major Japanese publisher of electronics publications, and CW. The paper also will serve as CW's Japanese news bureau.

Shukan Computer will cover the latest developments in computer-related hardware, software, services and supplies as well as application techniques and industry trends. Its newswriting organization includes the 25 editorial offices of Dempa throughout Japan and the U.S., a European-based editorial staff and correspondents of CW.

In addition to Shukan Computer, the joint venture company will conduct surveys on the computer market in Japan, and hold seminars and expositions on new computer equipment and techniques.

Early in 1974 Dempa Computerworld plans to run a Computer Caravan conference and exposition in five of Japan's

By 1977, IDC forecast that IBM Model 3705 controllers alone will account for about 7,000 units in use on System 360/370 computers, compared to its current base of less than 300.

Currently, operator-oriented terminals account for 71.4% of terminals installed in the U.S., while machine-oriented (no keyboard) total 5.7% of the installed base. The units falling in the special-purpose, or applications-unique, category comprise 22.9% of the base, according to IDC.

The compound growth rate of terminals until 1977 is estimated at 27% for the operator-oriented terminals, and 19% for machine-oriented, according to the study. Breaking down the category of operator-oriented terminals into conversational, which are basically TTY replacements, editing and processing, the latter group shows a jump from 16,000 or 5.7% of the number of operator-oriented terminals installed in 1972 to 17,6% or 160,000 in 1977, for a compound growth rate of 59%.

In the processing terminal category, CRTs show a growth rate of 65%, from 5,000 units to 60,000 units, for an estimated 6.6% of the installed operator-oriented base. The printers are expected to increase from 11,000 units to 100,000 units, a compound growth rate of 56%, for 11% of the 1977 base.

The editing units show a compound rate of 25%, with a growth from 77,500 units in 1972 to 239,000 units in 1977.

Computer received from major computer companies in both the U.S. and Japan, to account for 56% of the total base, with 507,000 units, while growing at a compound rate of 22%.



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Early in 1974 Dempa Computerworld plans to run a Computer Caravan conference and exposition in five of Japan's

largest cities. Patrick J. McGovern, president of IDC, said he was most pleased by the enthusiastic reception the initial issue of Shukan Computer received from major computer companies in both the U.S. and Japan.

"This response," he said, "indicates the industry agrees with us that the recent development of a broad base of knowledgeable computer managers and users in Japan has created the need for a publication to provide timely, realistic facts and appraisals about the latest developments in computer products and services and application techniques."

"There are now over 15,000 computers installed in Japan," McGovern stated, "and the number is growing at over 25% per year."

"Japan has now reached the distinction of being the world's largest computer market outside the U.S., and the recent liberalization of government policy on computer equipment makes it an especially attractive market for computer equipment makers headquartered in the U.S. and Europe."

The head office of Shukan Computer and Dempa Computerworld will be at 11-15, Higashi Gotanda 1-chome, Shinagawa-ku, Tokyo 141, Japan.

'Natural Growth'

Potter to Enter Stand-Alone Phase

By Molly Upton
of the CW staff

MELVILLE, N.Y. — Potter Instrument Co.'s plan to emphasize stand-alone systems is a "natural growth considering the kinds of things the company has been doing for quite a few years," Charles Scott, director of marketing, noted in a recent interview.

Until three or four years ago, Potter was entirely an OEM company, producing tapes, printers, disks, etc., when it started taking these same types of products and designing them on a plug-compatible basis for

the end user, he added.

"Our product line is broad enough in individual products that we can take these same products and put together, with minimal amount of purchased items from the outside, stand-alone systems," he explained.

Potter is introducing an off-line print station, which is comprised of a standard tape transport, standard printer and a small minicomputer, he said.

"The main objective is still to market and move the products our factory produces," Scott added.

Potter has also announced

plans to produce key-to-flexible disk entry systems.

"We build the printer that goes on it, we build the flexible disks, and we have been in keyboard data entry systems for a number of years, so it is a very logical sort of thing for us to put together," he said.

"Instead of just selling individual boxes, which we will continue to do, we will put more emphasis on gluing some of those boxes together into meaningful systems of their own, as opposed to simply tying them onto OEM accounts or user accounts," Scott continued.

Memorex Restructures Units

SANTA CLARA, Calif. — Memorex, Inc., hit by some executive resignations (CW, Feb. 7), has named three decentralized business units in a recent restructuring move.

"Integration of related operating functions is the objective" of the change, according to the firm.

The three units are: Computer Equipment Products Business, headed by John J. Kramer; Equipment Products Operations, managed by E. Douglas Larson; and Media Products Business, with J. Garrett Fitzgibbons as general manager. The men will report to President Laurence L. Spittler.

The Computer Equipment group will handle domestic and international marketing operations for equipment products, including sales and service.

The Equipment Products Operations unit will have charge of product development and manufacturing operations.

British Railways Orders Datapoint Units for Yards

SAN ANTONIO, Texas — The British Railway Board has awarded Unidata Ltd. a contract for up to 500 Datapoint 2200 Dispersed Data Processing Systems, with a purchase value of more than \$3 million in the U.S.

British Rail has an option to purchase an additional \$2 million of equipment.

The Datapoint units will be located in freight yards through-

Contracts

out the UK and linked to dual IBM 370s in London.

As part of the railroad's Total Operations Processing System, the units will permit control and monitoring of freight shipments throughout the country.

Other Contracts

Comten Inc. has been awarded a contract by Data Transmission Co. for the development of the Datran network prototype computer-switching system and the production of the first two dual on-line offices.

PRC Information Sciences Co., a Planning Research Corp. subsidiary, has been awarded a \$3 million contract to provide software support for the Strategic Air Command's Paer system. Paer aids Air Force photo interpreters and provides a data base of intelligence information.

The Telecommunications Division of Data Products Corp. will provide Futronics Corp. with 72 low-speed modems for use in Air Force mobile data terminals being assembled by Futronics.

John Hancock Mutual Life Insurance Co. has contracted with Analysis and Programming Corp. for conversion of John Hancock's policyholders index file to computer-readable magnetic tape.

Datamation Services Inc. will lease a \$120,000 IBM 360/40 and supporting equipment from Simplicity Computer Corp. under a two-year contract.

Computer Sciences Corp. has received a contract from the U.S. Army Electronics Command to study the feasibility of applying speech compression techniques to digital voice communications systems.



User Deserves Support, Not 'Hit-and-Run' Treatment

By Jerrold Asher

Special to Computerworld
Not long ago, a major mini-computer manufacturer ran a provocative advertisement showing a packing crate on a deserted railroad platform with the caption: "Most minicomputers aren't delivered—they're abandoned."

The message was obvious: most minicomputers are simply delivered, period. Systems support, software and other forms of customer handholding are left out.

Variations of this same philosophy can be seen in the newly arrived minicomputer business

machine market. Many of these systems are dropped on their unsuspecting users with one or maybe two simple applications installed.

The remainder of the applications—the tough ones—come later, sometimes very much later. Meanwhile, rent or lease payments have commenced.

Another approach is the offering of applications software developed and in use at a "similar" business. For a fixed price the new user can have those listings for installations on his new system.

But somebody forgets to tell

the new user that some tailoring or customizing of that existing software may be required to make those programs operate on his data (field sizes different,

Viewpoint

report sorts in different order, extra deductions required on the payroll check...).

Once again the rent and lease billings commence with the completion of hardware installation.

Finally, there is the "do-it-yourself" approach which is ob-

taining some popularity. With this plan, the user attends a vendor-sponsored school for a few days to a week learning how to program in a user-oriented compiler.

Hardware is installed, payments begin, and the user starts to "do his thing." Only the typical user is not a sophisticated programmer. Users have been known to wipe out disk files or write printout programs which must pause three seconds at the end of each print line to complete a data manipulation which should have taken place during input.

All of this is rather appalling. The first-time user deserves better treatment in his initial brush with modern electronic computers. He should be given guidance, instruction and support at least until his applications are installed and running perfectly. Then the vendor should collect his payment.

Software is fully as much a part of the total computer system as tape recordings are to a stereo system. Just because a manufacturer can plug in some CPU and a few components and get them all operating is hardly proof that a computer system is onstream.

Operating hardware cannot render useful work for a businessman until its programs are debugged and operating satisfactorily.

Give User a Break

Isn't it time our industry started giving the first-time user a better break instead of a bitter blackeye? Shouldn't the hardware vendor also be made responsible for installation and support of the software, until it can be demonstrated as operating properly; i.e., doing the applications and reports for which the businessman bought it.

The hit-and-run tactics of some firms are only profitable in the short run. In the long run they are pernicious to the entire computer industry. It's time the vendors of minicomputer business machines grew up to their responsibilities.

Asher is marketing manager of Sierra Data Systems, Inc., Pasadena, Calif.

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Aussie Firm Ships CRTs to NCR

Special to Computerworld

SYDNEY, Australia — The manufacture of CRT units for NCR has resulted in the development of the first commercial computer to be manufactured in this country.

As part of the NCR 799, the computer has a general-purpose instruction set, eight accessible registers and operates into a flexible data highway. The CRTs are manufactured by Amalgamated Wireless Australia Ltd.

NCR has been marketing its imported NCR 795 CRT units for some time, but decided to commission the manufacture of CRTs here in anticipation that the Federal Government would grant protection to the local electronics industry.

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COMPUTERWORLD

For a variety of reasons, IBM has dominated the EDP systems industry in a way that is almost unheard of in American business, except for publicly granted monopolies. But there are alternatives to the big boy. And that's what our March 28th Supplement is all about: *The Non-IBM World*.

Edited by *Computerworld's* Mike Weinstein, this study will include a look at the state of the industry, and a report on seven of IBM's competitors. Each of these companies—from Honeywell to Xerox Data Systems, has its own personality and its own place in the market. We'll be looking at their history, what they offer and where they stand. We'll also get opinions from their users, and try to create a picture of each one's strengths and weaknesses—to give you a clear idea of where it's at.

If you're a user who wants to look past IBM's looming frame, then our March 28th Supplement is the place to start. And if you're a marketer who wants to talk to the people who run this industry, your ad should be there when *The Non-IBM World* goes out. The supplement closes on March 9th. For details, just contact the nearest *Computerworld* Representative: Boston, Bob Ziegler, (617) 332-5606. New York, Don Fagan (212) 594-5644. Los Angeles, Bob Byrne (213) 477-4208. San Francisco, Bill Healey (415) 362-8547. Or write to: Judy Milford, *Computerworld*, 797 Washington Street, Newton, Mass. 02160

COMPUTERWORLD

Cogar Aims to Cancel Some of Its Debt

SCHUYLER, N.Y. — Cogar Corp., which has been feeling financially beset for some time, has come up with a reorganization plan that would clean up more than \$15.3 million of its indebtedness and leave the firm with \$1.3 million in mortgages. The plan hinges on issuing paper, quite a bit of it, to Singer Co. Under the plan, which is subject to several conditions and the approval of Cogar stockholders, Singer would cancel its \$6.5 million of convertible Cogar notes, together with \$280,540 of other indebtedness and \$610,000 interest, for about 4.8 million shares of a new class of common stock that will be convertible into common shares on a share-for-share basis.

Although the convertible stock would represent about 72% of the then outstanding shares of common and convertible stock, it would be entitled to 80% of the voting privileges of Cogar's capital shares.

Another Cancellation

The plan also calls for Chemical Bank of New York to cancel

the nearly \$2 million loan Cogar owes, in addition to about \$232,000 interest, in exchange for about 150,000 shares of a new class of preferred stock, some 15,000 common shares and warrants to purchase about 135,000 common shares.

The Oneida National Bank and Trust Co. would exchange the more than \$2 million in loan, mortgage and interest owed it for preferred and common shares and warrants.

In addition, Cogar will offer a 20% payment of the about \$2 million it owes to trade creditors. President George R. Cogar

said the firm has commitment for outside financing to accomplish this.

Cogar himself will throw in his \$1 million of convertible note plus \$94,000 interest and about 603,000 common shares. He will also trade the company's debt to him for a variety of shares and warrants.

If completed, the plan would cut Cogar's interest in the company to about 10% of the outstanding common and convertible shares from 52.4%. Cogar lost \$8.3 million on revenue of \$1.2 million in fiscal 1972.

Calkomp Hits Black in 2d Quarter

ANAHEIM, Calif. — Increased sales in the second quarter helped California Computer Products Inc. return to profitability sooner than the firm anticipated.

In the quarter ended Dec. 31, earnings rose to \$705,000 or 24 cents a share compared with a loss of \$277,000 in the same period a year ago.

Revenues climbed to \$20.5 million from \$12 million in the comparable 1971 period.

The second quarter showing

also helped reduce the first half loss to \$1.6 million on revenues of \$33.5 million compared with a loss of \$5.2 million on revenues of \$25.5 million a year earlier.

In the year ended June 30, Calkomp changed its accounting policies, posting a \$12.9 million loss. For the first half of 1972, there was a charge of \$4.7 million relating to changes in accounting for engineering and development costs and lease acquisition and installation costs.

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Three Memory Makers Show Turnaround

Three memory makers — Cambridge Memories, Advanced Memory Systems, Inc. (AMS) and Fabritek Inc. — have turned from loss to profit in periods ending in November and December.

AMS earnings for the first quarter ended Dec. 31, including a \$295,000 special credit, totaled \$639,258 or 36 cents a share compared with a loss of

\$325,793 or 38 cents a share in the same period last year. Revenues rose to \$6.1 million from \$1.5 million a year ago.

Fabritek completed its third quarter with earnings of \$390,022 or 11 cents a share compared with a loss of \$447,785 or 14 cents a share in last year's similar period.

There was also a \$246,200 special credit in the recent period, compared with a \$117,676 credit in 1971.

In the nine months, Fabritek's revenues rose to \$15.7 million from \$9.8 million in the year ago period.

Earnings declined, however, compared to last year's figures which were boosted by a \$1.9 million gain on the sale of Nicolet Instrument Corp.

Earnings totaled \$506,029 or 15 cents a share compared with \$643,826 or 20 cents a share in the 1971 period.

"Incoming orders continue at a high level, being somewhat greater than double that of last year," observed President M.F. Mickelson.

"Our end-user products [extension memories] continued to provide a significant part of our increased business," he added.

A recent agreement with Control Data for the sale of \$6 million of Fabritek extension

memories for IBM 360s "will provide a substantial base to offset the profit deferral that results from the direct leasing of our end user products," he continued.

"Incoming orders for our domestic OEM Memory Products Division have increased each quarter," Mickelson added.

Cambridge Leasing Grows

Cambridge Memories saw an increase of 45% in the number of memory systems on lease in the first quarter of 1973 compared with the same year-ago period, and "revenues from leased equipment represent an increasingly significant portion of our income," according to President Joseph F. Krivy.

In the three months ended Nov. 30, earnings, including a \$57,000 special credit, rose to \$118,099 or 9 cents a share compared with a loss of \$31,782 or 3 cents a share in the comparable year-ago period. Revenues rose to \$1.9 million from \$659,705 in the 1972 quarter.

During the first quarter "year ago the firm was investing" in an enlarged marketing organization to sell directly to computer users," Krivy noted.

Cambridge has usually had revenue and earnings increases each quarter over the past two years, he added.

Acquisitions

Advanced Memory Systems, Inc. (AMS) and Computer Microtechnology, Inc. (CMI) have agreed in principle to the acquisition of CMI by AMS involving the issuance of AMS common stock. AMS manufactures memory systems, sub-systems and components, and CMI makes integrated circuit memory components.

Kenington Management Consultants, Inc. affiliated with Kenington Equities Corp. of Stamford, Conn., together with a group of Science Accessories Corp. employees, has acquired Science Accessories Corp. from North American Phillips Co. Science Accessories manufactures graphic-to-digital converters and direct data entry devices.

GRI Computer Corp. has taken an option to acquire Focus Systems, Inc., San Antonio, for

an undisclosed amount of GRI common stock. Focus Systems markets the Focus IV system, a real-time, multipurpose, business data processing system based on the GRI-99 minicomputer.

Mellon National Corp.'s banking subsidiary, Mellon Bank, and Bradford Computer & Systems Inc., New York, have agreed in principle to form a jointly-owned company to provide stock transfer, registrar and similar services for Mellon's current customers for such services.

A tender offer by Vanier Graphics Corp. to stockholders of Management Systems, Inc. (MSI) has been consummated resulting in Vanier Graphics holding approximately 94% of the stock of the Tulsa-based firm. MSI will operate as a subsidiary of Vanier Graphics Corp.

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PRICE CHANGES THURSDAY, FEBRUARY 15, 1973

	1972 RANGE	CLOSE FEB 15	WEEK HIGH	WEEK LOW	NET CHG	PCT CHG
SOFTWARE & EDP SERVICES						
O ADVANCED COMP TECH	3-1	1 5/8	0	1/8	-7.1	0
O APPLIED DATA RES.	7-9	7 1/4	+3/4	+5.1	0	0
O AUTOMATIC DATA PROC.	1-4	2 7/8	-1/8	-4.1	0	0
O BRANSON APPLIED SYST	1-2	5/8	0	0.0	0	0
O COMPUTER DIMENSIONS	4-14	3 1/2	0	0.0	0	0
O COMPUTER DYNAMICS	1-4	1 7/8	0	0.0	0	0
O COMPUTER NETWORK	3-7	2 1/2	-1/2	-16.6	0	0
N COMPUTER SCIENCES	4-10	4 1/4	0	0.0	0	0
O COMPUTER TASK GROUP	1-2	1 1/2	+1/8	+9.0	0	0
O COMPUTER TECHNOLOGY	2-8	2 3/8	+1/4	+11.7	0	0
O COMPUTER USAGE	1-14	7 1/2	+1/4	+2.5	0	0
N COMPUTING & SOFTWARE	11-28	10 3/8	-1/4	-2.2	0	0
O COMSESS	1-3	7/8	-1/8	-12.5	0	0
O COMSHARE	5-9	7 5/8	0	0.0	0	0
O DATAR	1-9	3 5/8	0	0.0	0	0
O EDP RESOURCES	2-8	1 3/4	0	0.0	0	0
A ELECT COMP PROG	4-11	3 1/2	0	0.0	0	0
O ELECTRONIC DATA SYS.	4-11	3 1/2	0	0.0	0	0
O INFORMATICS	4-11	3 1/2	-1	-20.0	0	0
O I-P-D-A DATA CORP	1-3	1 1/2	0	0.0	0	0
O KEANE ASSOCIATES	4-7	3 3/4	0	0.0	0	0
O KEYDATA CORP	7-13	9 5/8	0	0.0	0	0
O LOGICON	4-8	5 1/4	+1 3/8	+35.4	0	0
O NATIONAL CSS INC	3-10	3 1/4	-1/4	-7.1	0	0
O NATIONAL INFO SVCS	0-5T	35 3/4	+3 3/8	+10.0	0	0
N PLAN LINE SYSTEMS INC	8-28	23	-1 1/4	-5.1	0	0
N PLOW INC RESEARCH	2-17	3 3/4	-1/2	-12.2	0	0
O PROGRAMMING METHODS	2-25	22 1/2	-1	-4.2	0	0
O PROGRAMMING & SYS	1-2	1	+1/8	+16.7	0	0
O RAFTATA INC	1-27	21 1/4	0	0.0	0	0
O SCIENTIFIC COMPUTER	2-4	1 1/2	0	0.0	0	0
O SIMPLICITY COMPUTER	1-4	1 1/2	-1/4	-17.1	0	0
O T&S COMPUTER CENTERS	6-3	3 1/4	0	0.0	0	0

PERIPHERALS & SUBSYSTEMS

N ADVANCEDOGRAPH-HULT	24-49	24 1/2	+1/4	+1.0	0	0
N AMPER CORP	12-23	18	-7/8	-4.2	0	0
N AMPER CORP	5-15	6	-3/8	-5.8	0	0
N ANDERSON JACKSON	1-8	0	+1/2	+10.0	0	0
N BEHNE MEDICAL ELEC	1-6	3/8	-3/8	-5.8	0	0
A BOLT-BERANEY & NEW	5-21	9	-3/4	-7.6	0	0
N BUNER-RAND	8-14	1 1/4	0	0.0	0	0
A CALCOMP	9-25	12 1/4	+1 1/8	+10.1	0	0
O CARIBBEA MEMORIES	0-15	11 1/8	+3/4	+7.2	0	0
D CENTRONICS DATA CORP	6-28	23 3/4	-1/2	-2.0	0	0
O CODEC CORP	6-28	10	0	0.0	0	0
O CONTECHNICS	2-5	1 5/8	0	0.0	0	0
D COMPUTER CORP	3-14	7	-1/8	-1.3	0	0
D COMPUTER EQUIPMENT	2-4	2 1/4	-1/8	-3.3	0	0
O COMPUTER MACHINERY	7-13	11 3/8	+1/2	+4.2	0	0
O COMPUTER TRANSCIVER	2-9	3 1/2	-3/8	-9.0	0	0
O COMPUSET	3-9	3 1/2	0	0.0	0	0
N CONRAC CORP.	2-14	3 1/2	-1/2	-20.0	0	0
A DATA PRODUCTS CORP	3-7	7 3/8	+1/2	+14.8	0	0
A DATA RECOGNITION	1-2	1 1/2	0	0.0	0	0
A DATA TECHNOLOGY	2-5	4 1/8	0	0.0	0	0
O DIAN CONTROLS	0-8	3 7/8	0	0.0	0	0
N ELECTRONIC M & H	3-8	4 3/4	+5/8	+15.6	0	0
A EMBIT-TEK	3-5	5/8	0	0.0	0	0
N GENERAL COMPUTER SYS	8-16	10 1/4	+1 1/4	+17.8	0	0
N GENERAL ELECTRIC	3-9	4 7/8	+3/8	+7.6	0	0
N HAZELTINE CORP	7-13	3 3/8	-1/4	-11.9	0	0
O INFORX INC	10-16	13 7/8	-1 5/8	-10.4	0	0

O INFORMATION DISPLAYS	1-5	7/8	+1/4	+22.2	0	0
O INFORMATION INT'L INC	8-24	13 1/2	-1/2	-3.7	0	0
A LUNDO ELECTRONICS	7-14	4 1/2	-1/2	-17.1	0	0
O MANAGEMENT ASSIST	1-1	1 1/2	+1/8	+6.3	0	0
N BELSO ELECTRONICS	15-44	3	+3/8	+12.5	0	0
N MIMAK DATA SCI	8-27	9	+3/4	+9.0	0	0
D ODEC COMPUTER SYST.	1-1	1	0	0.0	0	0
O OPTICAL SCANNING	3-16	3 1/2	+1/4	+6.8	0	0
O PERITEC CORP	0-17	6 3/4	+1/2	+8.0	0	0
O PHOTON	3-15	4 3/8	+1/2	+14.4	0	0
O PRINTER INSTRUMENT	7-21	1 1/2	0	0.0	0	0
O PRECISION INST.	2-13	5	+1	+20.0	0	0
O RECOGNITION EQUIP	5-13	2 1/2	+3/8	+15.0	0	0
N SANDERS ASSOCIATES	13-21	12 3/4	+1/4	+4.0	0	0
O SCAN DATA	3-13	3 3/8	0	0.0	0	0
O STORAGE TECHNOLOGY	17-39	23 1/2	-1 3/4	-6.9	0	0
D SYCOR INC	0-15	11 5/8	-1/2	-4.1	0	0
O TALLY CORP.	3-15	6 1/2	+2	+24.3	0	0
N TETRONIX INC	4-15	4 1/8	-1/4	-5.8	0	0
D WILTEK INC	10-26	15 3/4	0	0.0	0	0

SUPPLIES & ACCESSORIES

O BALTIMORE BUS FORMS	5-9	6 1/2	0	0.0	0	0
A BARRY WRIGHT	0-14	4 1/4	-1/8	-1.9	0	0
A DATA DOCUMENTS	17-26	20	-1/2	-2.0	0	0
O DUPLIX PRODUCTS INC	8-14	3 1/2	-1/2	-17.1	0	0
N ENNIS BUS FORMS	10-15	6 3/4	-3/8	-5.2	0	0
O GRAMMAG HANDBOOKS	15-21	17 3/4	+1/4	+1.6	0	0
O GRAMMAG CONTROLS	11-15	11 1/8	-1/8	-0.7	0	0
N 3M COMPANY	76-85	83	-3/8	-0.4	0	0
O MOORE CORP LTD	42-51	55 5/8	-3/8	-11.1	0	0
N NASHUA CORP	48-52	54 3/4	-3/8	-10.0	0	0
N NEWBROS & NEWOLD	37-47	40 3/8	-3/8	-0.8	0	0
O STANDARD REGISTAR	14-20	18 1/2	-1/2	-2.6	0	0

	1972 RANGE	CLOSE FEB 15	WEEK HIGH	WEEK LOW	NET CHG	PCT CHG
PERIPHERALS & SUBSYSTEMS						
M T&S PRODUCTS CO	11-23	20	+1	+5.2	0	0
N UARCO	20-28	21 5/8	-1/8	-0.5	0	0
O T&S MAGNETICS	5-11	6 1/8	-1/8	-2.0	0	0
N WALLACE BUS FORMS	21-26	23	+5/8	+2.6	0	0
COMPUTERS SYSTEMS						
O BURROUGHS CORP	147-240	233	+9 1/4	+4.1	0	0
N COLLINS RADIO	14-27	21 5/8	+1 1/8	+5.4	0	0
N CONTROL DATA CORP	43-78	48 1/2	-5 1/2	-10.1	0	0
O DATA GENERAL CORP	86-133	138 1/2	+8 1/2	+7.2	0	0
O DIGITAL COMP CONTROL	6-25	3 1/2	-1/4	-6.0	0	0
O ELECTRONIC EQUIPMENT	12-105	97 1/4	0	0.0	0	0
N ELECTRONIC ASSOC.	6-13	7 5/8	+3/8	+5.1	0	0
A ELECTRONIC ENGINEER.	6-14	9	+5/8	+7.4	0	0
N FORBORG	23-41	29 1/8	+1/2	+1.7	0	0
O GENERAL AUTOMATION	13-35	33	+4 1/8	+12.2	0	0
O GRI COMPUTER CORP	2-5	2 1/4	-1/8	-5.2	0	0
N HEWLETT-PACKARD CO	4-6	5 5/8	+1/8	+2.5	0	0
O IBM	115-170	114 1/2	+1/8	+0.2	0	0
N IBM	333-451	441 1/2	+4	+0.9	0	0
O INTERDATA INC	8-16	11 1/8	+7/8	+6.5	0	0
N MEMORX	13-38	12 3/4	+1/4	+1.4	0	0
O MICRODATA CORP	3-10	8 5/8	+1/8	+1.4	0	0
N NCR	27-38	29	+1 1/4	+4.5	0	0
N RAYTHEON CO	27-47	32 1/8	+1 1/8	+5.3	0	0
N SPERRY RAND	39-50	46 3/4	+7/8	+1.9	0	0
A SYSTEMS ENG. LARS	6-16	5 7/8	0	0.0	0	0
N VARIAN ASSOCIATES	14-29	16 3/8	+3/4	+4.7	0	0
O MICRODATA CORP	23-43	28 1/2	-2 1/4	-11.8	0	0
N XEROX CORP	121-172	161 1/8	+7/8	+0.5	0	0
LEASING COMPANIES						
A BODINE COMPUTER	3-18	3 7/8	+1 1/4	+47.0	0	0
O BRESNAN COMP.	1-3	1 1/4	0	0.0	0	0
O COMSCO INC	3-11	3 1/4	+3/8	+2.4	0	0
O COMMERCE GROUP CORP	2-10	2 1/8	+1/8	+2.5	0	0
O COMPUTER EXCHANGE	1-3	3/4	+1/8	+20.0	0	0
O COMPUTER INVESTIG CORP	6-14	5 3/4	+1/4	+4.1	0	0
O COMP. INSTALLATIONS	5-2	2	0	0.0	0	0
N DPF INC	5-13	7 3/8	-3/8	-4.8	0	0
M ELECTRONIC RENTAL	2-6	2 1/4	0	0.0	0	0
A ECL INC	12-24	12 1/2	+1/2	+4.3	0	0
A OEBRONN-INC	16-26	26 3/8	+3/8	+1.7	0	0
A OPA, INC.	5-11	5	-1/4	-4.7	0	0
A GRANITE MGT	5-11	5	-1/8	-2.0	0	0
A GREYHOUND COMPUTER	11-15	12 1/8	-1/8	-2.3	0	0
A ITEL	7-12	9 1/8	-1/4	-2.6	0	0
O LEASCO CORP	12-24	12 1/2	+1/2	+4.3	0	0
O LECTRO MGT INC	6-15	4	0	0.0	0	0
O ROCKWOOD COMPUTER	1-4	1 3/8	0	0.0	0	0
O SYSTEMS CAPITAL	3-20	8 3/4	-1 1/8	-11.3	0	0
N U.S. LEASING	10-35	29 7/8	-1/8	-0.4	0	0

ECHT-NEW YORK EXCHANGE: A=AMERICAN EXCHANGE

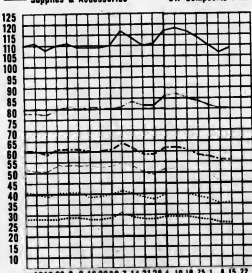
L=NATIONAL EXCHANGE; D=OVER-THE-COUNTER

O-T-C PRICES ARE BID PRICES AS OF 3 P.M. OR LAST BID

(1) TO NEAREST DOLLAR

Computer Stocks Trading Index

Computer Systems Software & EDP
Peripherals & Subsystems Services
Supplies & Accessories Leasing Companies
M & C Composite Index



1218 28 2 16 2230 7 14 2128 4 10 18 23 1 8 15 22
JAN FEB
OCT NOV DEC

Earnings Reports

RECOGNITION EQUIPMENT

Year Ended Oct. 31

	1972	1971
Shr Earnings	8.07	8.06
Revenue	42,864,000	38,927,000
Spec Int	1,061,000	2,537,000
Earnings	337,000	309,000

a-Related to include results of 48%-owned Corporation 5 on an equity accounting basis. b-Deduct includes losses from operations of intangible, affect of Corporation 5 and currency fluctuations. Inc on sale of stock in Occulcor Corp. c-Credit, computed on basis of Corporation 5's carryforward, reversal of previous warranty of investment in Occulcor Corp. and translation of foreign currency, less loss on sale of investment.

HEWLETT-PACKARD

Year Ended Oct. 31

	1972	1971
Shr Earnings	11.48	8.92
Revenue	479,077,000	375,088,000
Spec Crd	1,211,000	1,010,000
Earnings	36,483,000	23,881,000

a-Related to include results of 48%-owned Corporation 5 on an equity accounting basis. b-Deduct includes losses from operations of intangible, affect of Corporation 5 and currency fluctuations. Inc on sale of stock in Occulcor Corp. c-Credit, computed on basis of Corporation 5's carryforward, reversal of previous warranty of investment in Occulcor Corp. and translation of foreign currency, less loss on sale of investment.

DINAM CONTROLS

Year Ended Dec. 30

	1972	1971
Shr Earnings	1.82	0.95
Revenue	1,821,200	935,749
Spec Crd	100,200	10,400
Earnings	220,900	51,049

COMPUTING & SOFTWARE

Year Ended Oct. 31

	1972	1971
Shr Earnings	8.05	8.96
Revenue	110,885,000	94,988,000
Spec Crd	187,000	103,000
Spec Chg	1,080,000	(880,000)
Earnings	5,968,000	5,986,000

a-Related to reflect acquisitions on a pooling-of-interests basis and to eliminate discontinued operations. b-From continuing operations. c-From discontinued operations. d-Facilities in an acquired company and from discontinued businesses less gain on sale of securities in an acquired company.

MOHAWK DATA SERVICES

Six Months Ended Oct. 31

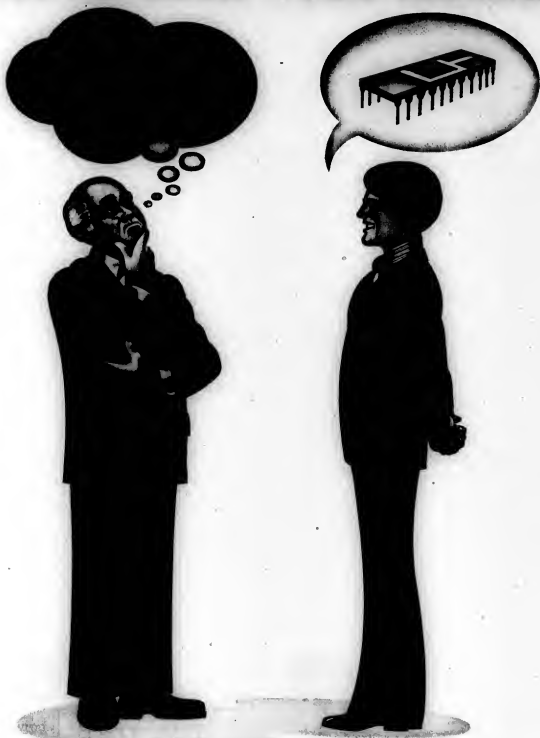
	1972	1971
Shr Earnings	8.05	8.21
Revenue	58,503,000	54,865,000
Spec Crd	1,018,000	1,018,000
Earnings	301,000	1,190,000

a-Includes results of Colorado Instruments Inc. and Marshall Data Systems Inc. from Sept. 30, 1971 and Jan. 11, 1972, their respective dates of acquisition. b-Tax loss carryforward.

NATIONAL SEMICONDUCTOR

Three Months Ended Dec. 31

LET US REFRESH YOUR MEMORY.



If you're being slowed down by core memory, we'd like to refresh you with a few facts about add-on AMS Monolithic Main Memory from ITEL:

With it, you can upgrade memory at less cost than core, and it's far more reliable.

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From the 360/22 up through all models of System/370. Add Monolithic Memory to a 370/155 for example, and you can expand the memory from two megabytes to four megabytes—a 100% increase!

And Monolithic Memory utilizes semiconductor chips that eliminate most wired interconnections, so there are far fewer potential sources

of failure.

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